Chapter III: Affected Environment and Environmental Consequences

This chapter describes the Affected Environment and the Environmental Consequences associated with the actions proposed by the Yosemite Valley Loop Road Project. In order to have a more concise, streamlined, and user-friendly document, this chapter combines the Affected Environment and Environmental Consequences discussions rather than including them as separate chapters, as has occurred in past NEPA documents authored by Yosemite National Park.

Discussions Regarding the Affected Environment and Analysis of Environmental Consequences

More general and/or regional information regarding the affected environment for specific resource topics in Yosemite Valley and adjacent areas has been provided in a number of recent NEPA documents prepared for actions proposed for Yosemite Valley since 2000. These documents are available for review on the park's website at http://www.nps.gov/yose/planning/ and include the following:

- *Yosemite Valley Plan EIS* - Revised Record of Decision (ROD) in 2000
- *Merced River Plan FEIS* - ROD in 2000
- *Revised Merced River Plan SEIS* - ROD in 2005
- Happy Isles Bridge Removal - Finding of No Significant Impact (FONSI) in 2001
- Lower Yosemite Falls Improvement Project - FONSI 2002
- East Valley Utilities Improvement Project – FONSI 2003
- Curry Village and East Valley Improvements Project - FONSI 2004
- Yosemite Lodge Area Redevelopment Project – FONSI 2004

A discussion of each alternative contains an analysis of the Affected Environment and Environmental Consequences for each individual resource topic. Impacts are evaluated based on context, duration, intensity, and type, and whether they are direct, indirect, or cumulative. In addition, impairment to park resources and values is considered.

The following guidelines were used to identify the context, duration, intensity (or magnitude), and type of impact for each resource topic, with the exception of Cultural Resources.

- *Context*. The context considers whether the impact would be local or regional. For the purposes of this analysis, local impacts would be those that occur in the immediate vicinity of an action or in a nearby area indirectly affected by the action, unless specifically noted otherwise in the Environmental Consequences discussion for individual resource topics.
- *Duration*. The duration of an impact is noted as either short-term or long-term in nature. Short-term impacts are typically associated with construction-related actions and could last up to two years unless otherwise noted. Long-term impacts are those that would typically last longer than two years unless otherwise noted.
- *Intensity*. The intensity of an impact, whether it is negligible, minor, moderate, or major, is included in the impact analysis for each resource topic considered in this document.

- *Type*. The type of impact refers to whether the impact is considered beneficial or adverse. Beneficial impacts would improve resource conditions. Adverse impacts would deplete or negatively alter resources.

To fulfill the requirements Section 106 of the National Historic Preservation Act (NHPA), the following guidelines were used to identify the context, duration, intensity (or magnitude), and type of impact for each resource topic within Cultural Resources.

- *Context*. The context considers whether the impact would be local or regional. For the purposes of this analysis, local impacts would be those that occur in the immediate vicinity of an action or in a nearby area indirectly affected by the action, unless specifically noted otherwise in the Environmental Consequences discussion for individual resource topics.
- *Duration*. Any impact to a cultural resource is considered long-term and of permanent duration.
- *Intensity*. The description of the intensity of an impact to a cultural resource is limited to whether the impact has no effect, an adverse effect, or no adverse effect, as defined in the implementating regulations (36 CFR Part 80) for Section 106 of the NHPA. An adverse effect would be considered a major impact under NEPA.
- *Type*. Under NHPA, unlike under NEPA, only adverse impacts are taken into consideration, so beneficial impacts are not considered in the analysis.

Cumulative Impacts

The CEQ describes a cumulative impact as follows (Regulation 1508.7):

> *"….a "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."*

General guidance and methodologies for the cumulative impacts analysis in this document generally follow those published by the Council on Environmental Quality (CEQ 1997). The cumulative projects addressed in this analysis include past actions, present actions, as well as any planning or development activity currently being implemented or planned for implementation in the reasonably foreseeable future. Cumulative actions are evaluated in conjunction with the impacts of an alternative to determine if they have any additive effects on a particular resource. Because some of the cumulative projects are in the early planning stages, the evaluation of cumulative impacts was based on a general description of the project. Appendix A contains the list of cumulative projects included in the cumulative impacts analysis.

Cumulative effects to resources outlined below are based on analysis of past, present, and reasonably foreseeable future actions in Yosemite Valley in combination with potential effects of each alternative considered.

Impairment

Impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. The need to analyze and disclose impairment impacts originates from the National Park Service Organic Act (NPS 1916). The Organic Act established the National Park Service with a mandate "to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

An impact would be less likely to constitute impairment if it is an unavoidable result, which cannot reasonably be further mitigated, of an action necessary to preserve or restore the integrity of park resources or values. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park
- Key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park
- Identified as a goal in the park's *General Management Plan* or other relevant National Park Service planning documents

The evaluation of impairment of park resources was based on the type and intensity of impacts and the types of resources affected. Overall, beneficial impacts would not constitute impairment. With respect to the intensity of impacts, negligible and minor, adverse impacts are not of sufficient magnitude to constitute impairment. Moderate and major adverse impacts may constitute impairment but do not automatically do so. Rather, these impacts must be analyzed with respect to the three bulleted criteria above. Impairment is generally considered for geologic, hydrological, biological, cultural, and scenic resources and recreation. Impairment is addressed in the conclusion section of each impact topic under each alternative.

Resource Topics Considered in this Environmental Assessment

Resource topics considered were selected based on federal law, regulations, executive orders, NPS Management Policies, National Park Service subject matter expertise, and concerns expressed by other agencies or members of the public during scoping and comment periods.

Natural Resources

The federal and state Endangered Species Acts (and associated legislation), Clean Water Act, Clean Air Act, and National Environmental Policy Act (NEPA) require that the effects of any federal undertaking on natural resources be examined. The Wild and Scenic Rivers Act specifies guidelines for the determination of appropriate actions within the bed and banks of a Wild and Scenic River and requires managing agencies to determine whether water resources projects would adversely affect free flow or Outstandingly Remarkable Values. In addition, National Park Service management policies and natural resource management guidelines call for the

consideration of natural resources in planning proposals. Yosemite Valley is an area of abundant natural resources and contains stretches of the Merced River that are designated as wild and scenic. It is therefore necessary to characterize both these natural resources and the environmental consequences to these resources that could result from implementation of the Yosemite Valley Loop Road Project alternatives. Analysis was performed for the following natural resource topics: soils; hydrology, floodplains, and water quality; wetlands; vegetation; wildlife; special-status species; air quality; and noise.

Cultural Resources

The NHPA, the Archaeological Resources Protection Act (ARPA), the Native American Graves Protection and Repatriation Act (NAGPRA), the American Indian Religious Freedom Act (AIRFA) and NEPA require that the effects of any federal undertaking on cultural resources be examined. In addition, National Park Service management policies and cultural resource management guidelines call for the consideration of cultural resources in planning proposals. Significant cultural resources exist within the project area and adjacent areas and could be affected by the alternatives. Therefore, analysis was performed for archeological resources, traditional cultural properties, and the cultural landscape, including historic sites and structures, following the guidelines set forth by NHPA.

Social Resources

The analysis of social resources examines the effects of the Yosemite Valley Loop Road Project on the social environment within the park. Stewardship of Yosemite National Park requires consideration of two integrated purposes: to preserve Yosemite's unique natural and cultural resources and scenic beauty, and to make these resources available to visitors for study, enjoyment, and recreation. Resources analyzed and addressed include scenic resources, visitor experience and recreation, and park operations and facilities.

Impact Topics Dismissed From Further Analysis

Environmental Justice

No aspect of the alternatives of the Yosemite Valley Loop Road Project would result in disproportionately high and adverse human health or environmental effects on minority or low-income populations; destruction or disruption of community cohesion and economic vitality; displacement of public and private facilities and services; increased traffic congestion; and/or exclusion or separation of minority or low-income populations from the broader community.

Natural Resources

Geology and Geologic Hazards

The Yosemite Valley Loop Road Project does not propose to construct any new facility or structure other than the placement of new culverts beneath the road as shown on figure II-3. Therefore, there are no potential effects to geology or from geologic hazards related to any of the proposed actions. Therefore, these resource topics have dismissed from further analysis in this document.

Prime and Unique Agricultural Lands

There are no known agricultural lands in the project area, and the proposed action would not have any indirect effects to downstream agricultural lands. Therefore this resource topic has been dismissed from further analysis in this document.

Social Resources

Wilderness Experience

There is no designated Wilderness within the project area. Implementation of the proposed action would not have any direct or indirect effects to designated Wilderness in adjacent areas. Therefore this resource topic has been dismissed from further analysis in this document.

Land Use

Land uses within Yosemite National Park are classified as "Parklands," regardless of the individual types of land uses within the park. Implementation of the Yosemite Valley Loop Road Project would not affect Parkland land uses within the park. Therefore this resource topic has been dismissed from further analysis in this document.

Socioeconomics

There would be no measurable effects to the regional or gateway community economies, or changes in visitor attendance or visitor spending patterns as a result of implementation of the Yosemite Valley Loop Road Project. Therefore this resource topic has been dismissed from further analysis in this document.

Transportation

The Yosemite Valley Loop Road Project does not propose to change existing vehicular or pedestrian circulation patterns, levels of service at intersections, or established speed limits along the Yosemite Valley Loop Road. Therefore this resource topic has been dismissed from further analysis in this document.

Energy Consumption

Implementation of the Yosemite Valley Loop Road Project would not cause measurable increases or decreases in the overall consumption of electricity, propane, wood, fuel oil, gas or diesel for stationary or mobile sources associated with visitor attendance or the continued operation and maintenance of park operations and facilities in Yosemite Valley. Therefore this resource topic has been dismissed from further analysis in this document.

Museum Collection

Implementation of the Yosemite Valley Loop Road Project could indirectly affect the museum collections by generating minimal additions to the collections due to the potential need for archeological data recovery performed as mitigation for direct site impacts at select locations. Such additions would require museum storage space and ongoing collection maintenance and management. Any efforts associated with this is expected to be minimal and undertaken as part of routine collection duties associated with the maintenance of the museum collection. Therefore this resource topic has been dismissed from further analysis in this document.

Mitigation Measures Common to All Action Alternatives

The National Park Service places a strong emphasis on avoidance, minimization, and mitigation of impacts. To help ensure that field activities associated with the Yosemite Valley Loop Road Project protect natural, cultural, and social resources and the quality of the visitor experience, mitigation measures have been developed that are common to all action alternatives. A discussion of mitigation measures that would occur prior to, during, and after construction is presented in Appendix B.

Affected Environment and Environmental Consequences

Natural Resources

Soils

Affected Environment

Most of Yosemite Valley is an active floodplain of the Merced River. During Merced River flood events, alluvial soils are formed and removed as floodwaters deposit and erode material over the floodplain. Valley soil textures vary from fine sand to fine gravel. Most soils have a relatively undeveloped profile, indicating their relatively recent origin and young geologic age.

Certain soil types have been identified in Yosemite Valley as highly valued resources. The criteria used to designate highly valued resource soils include the potential for restoring highly valued vegetation communities, those that support wetland communities and are therefore protected by federal laws, and significance as a sensitive area (such as soils that take an inordinately long time to recover from disturbance). Typically, a highly valued resource soil is more suitable for restoration.

Soils that are more suitable for development are identified as resilient. Resilient soils are those capable of withstanding alteration without permanent deformation, or recover more easily from alteration. Generally, resilient soils do not have major development limitations or restrictive physical attributes.

Other soils are not considered highly valued resources or resilient soils. Generally, these soils place more limitations on use because of steep slopes or other physical attributes. Other soils do not fit into the highly valued resource soil resource category because they are generally more abundant and do not support plant communities that are rare or especially diverse.

Soil types in Yosemite Valley and their classification are shown in table III-1 and depicted in figures III-1 and III-2.

Environmental Consequences – Methodology

Duration of Impact: The duration of soils impacts was characterized as short-term or long-term. Short-term impacts could be restored when project construction is completed and were considered to last 20 years or less. Long-term impacts were considered to last over 20 years.

Intensity of Impact: The evaluation of the intensity of impacts on soils focuses on highly valued resource soils, resilient soils, and other soils. Impact intensity was characterized as negligible, minor, moderate, or major. Definitions of impact intensities for various soil types are provided in table III-2.

Type of Impact: Beneficial impacts to soils protect or restore natural soil conditions, including soil structure, and moisture. Adverse impacts would result in degradation of chemical or physical soil components.

Table III-1
Soil Types in Yosemite Valley

Soil Type	Resource Type
101 Riverwash, 0-2%	Highly Valued Resource
102 Riverwash, 1-4%	Highly Valued Resource
104 Aquandic Humaquepts, 0-2%	Highly Valued Resource
105 Histic Haploaquols	Highly Valued Resource
151 El Capitan fine sandy loam, 0-2%	Highly Valued Resource
152 Vitrandic Haploxerolls, 0-3%	Other
201 Leidig fine sandy loam, 0-2%	Highly Valued Resource
301 Vitrandic Haploxerolls, coarse loamy, 0-2%	Highly Valued Resource
401 Sentinel loam, 0-2%	Resilient
412 River course	Highly Valued Resource
501 Miwok complex, 1-5%	Resilient
502 Miwok sandy loam, 0-3%	Other
504 Mollic Xerofluvents, 1-5%	Other
551 Miwok – Half Dome complex, 5-15%	Other
552 Mollic Xerofluvents, 5-15%	Other
590 Terric Medisaprist, 0-3%	Highly Valued Resource
601 Half Dome complex, 25-60%	Other
602 Half Dome extremely stony sandy loam, 10-25%	Other
610 Rubble land – Half Dome complex, 25-60%	Other
620 Half Dome complex, warm phase, 25-60%	Other
630 Rubble land – Half Dome complex, warm phase, 25-60%	Other
701 Vitrandic Haploxerolls, 4-30%	Resilient

SOURCE: Soil Survey of Yosemite National Park, Yosemite Valley, California (SCS 1991)

Table III-2
Soil Impact Intensity Definitions

		Degree of Impact			
Soil Type	History of Disturbance	Small Scale (Less that 1 acre)	Small Scale but Measurable (>1 to 3 acres)	Measurable and Moderate Scale (>3-10 acres)	Large Scale (>10 acres)
Resilient Soils	Previously Disturbed	Negligible	Negligible	Minor	Moderate
	Undisturbed	Negligible	Minor	Moderate	Moderate
Other Soils	Previously Disturbed	Negligible	Minor	Moderate	Moderate
	Undisturbed	Minor	Moderate	Moderate	Major
Highly Valued Resource Soils	Previously Disturbed	Minor	Moderate	Moderate	Major
	Undisturbed	Moderate	Moderate	Major	Major

SOURCE: Soil Survey of Yosemite National Park, Yosemite Valley, California (SCS 1991)

Placeholder for Figure III-1. (West Valley soils). Click here to open.

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Placeholder for Figure III-2. (East Valley soils). Click here to open.

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Environmental Consequences of Alternative 1 (No Action)

Under Alternative 1, the overall condition of the Yosemite Valley Loop Roadway would continue to be addressed on an 'as need be' basis, through localized pothole repair and patch resurfacing. Parking and roadside activities would continue to occur in an informal manner in many areas along the Yosemite Valley Loop Road. Parking in roadside areas that are not curbed or that do not have barrier stones would continue to expand off the road shoulder and adversely affect adjacent soils. Examples include the Wosky Pond area and along El Capitan Straight along Northside Drive, where roadside parking has expanded off the existing road shoulder, resulting in a localized, minor, long-term, adverse impact to adjacent highly valued soils.

Poor, and in some areas, non-functional roadside drainage would continue to occur along portions of the Yosemite Valley Loop Road. Culverts that are collapsed or in disrepair, coupled with poor roadside drainage, impede natural surface water flow especially during periods of high runoff in spring and early summer. Examples of this include areas along Bridalveil Straight, Sentinel Creek drainage, and El Capitan Straight, where water unnaturally ponds in areas along the upstream side of the road and is not naturally distributed to the downstream side of the road. This represents a localized, long-term, minor to moderate, adverse impact to the natural sedimentation processes and potentially to the overall soil profile in these and similar areas where surface drainage is impeded.

Roadside and riverbank erosion as a result of poor roadside drainage in the immediate vicinity of the Pohono Bridge would continue to occur. Given the very localized nature of this erosion and the soil in this area being classified as "other", this represents a long-term, negligible, adverse impact to soils in this area.

Cumulative Impacts: Certain development projects in the Valley could result in increased degradation of soil resources, such as the expansion of campgrounds, construction of lodging and employee housing, and utility improvements in some areas as identified in the *Yosemite Valley Plan* (NPS 2000a). However, other *Yosemite Valley Plan* projects related to habitat restoration (such as removal of roads through Stoneman and Ahwahnee Meadows and the Visitor Use and Floodplain Restoration in East Yosemite Valley Project) and designed to restore wet meadow habitats in areas previously developed as campgrounds would have long-term, beneficial effects on soils. Although these types of projects may have slight site-specific, short-term, adverse effects (e.g., potential construction erosion and soil loss), the objective of these projects is to restore and manage natural resources and reduce soil degradation. For example, full implementation of the *Yosemite Valley Plan* would restore approximately 177 acres of soil, of which approximately 136 acres would be highly valued resource soils in Yosemite Valley. In addition, the continued implementation of the VERP program as outlined in the *Revised Merced River Plan* (NPS 2005b) will help to protect soil resources in some areas of the Valley. Overall, Alternative 1, in combination with the cumulative projects, would result in local, long-term, negligible to minor, beneficial cumulative impacts to soil resources.

Impairment: Impacts to soils associated with Alternative 1 would be localized, long-term, negligible to moderate, and adverse along and adjacent to portions of the Yosemite Valley Loop Road. Alternative 1 would not impair soil resources of the park for future generations.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

Resurfacing and rehabilitation of the roadway would not adversely affect soils, as the activity would take place within the existing disturbed footprint of the road prism. Curbing and/or the placement of barrier stones at many roadside parking areas, particularly those in areas that have been identified as having either resilient or highly valued resource soils would help keep vehicles in designated turnouts and help prevent vehicles from encroaching into these sensitive soil areas. These proposed actions would result in a long-term, minor, beneficial impact to soils.

Improvements to roadside drainages, coupled with the rehabilitation or replacement of existing culverts and installation of new culverts in select areas would promote natural flow of surface water from one side of the road to the other, which would promote natural sedimentation processes and promote the development of a natural soil structure and profile. This would be a long-term, minor to moderate, beneficial impact, particularly in areas where the road passes through resilient and/or highly valued resource soil types.

Improved drainage and the rehabilitation of the river bank, including placement of stone material to match existing bank elevations in the immediate vicinity of the Pohono Bridge would help minimize localized soil loss, a long-term, negligible, but beneficial impact to soils in that area.

Cumulative Impacts: Although actions under Alternative 2 include placement of curbing and/or barrier stones to help prevent vehicle encroachment into areas where soils have been identified as highly valued resource soils, along with other benefits to soils as described above, overall past, present and reasonably foreseeable cumulative actions in conjunction with those actions called for under Alternative 2 would be generally the same as those described for Alternative 1. These would represent a net long-term, minor, beneficial impact to soils in Yosemite Valley.

Impairment: Impacts to soils associated with Alternative 2 would be localized, long-term negligible to moderate and beneficial along and adjacent to portions of the Yosemite Valley Loop Road. Alternative 2 would not impair soil resources of the park for future generations.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Resurfacing and rehabilitation of the roadway would not adversely affect soils, as the activity would take place within the existing road prism. However, parking and roadside activities would continue to occur in an informal manner in many areas along the Yosemite Valley Loop Road. Parking in roadside areas that are not curbed or that do not have barrier stones would continue to expand off the road shoulder and adversely affect adjacent soils. Examples include the Wosky Pond area and El Capitan Straight along Northside Drive, where roadside parking has expanded off the existing road shoulder, resulting in a localized, minor, long-term, adverse impact to adjacent highly valued soils.

Improvements to roadside drainages, coupled with the rehabilitation or replacement of existing culverts and installation of new culverts in select areas would promote natural flow of surface water from on side of the road to the other, which would promote natural sedimentation processes and promote the development of a natural soil structure and profile. This would be a long-term, minor to moderate, beneficial impact, particularly in areas where the road passes through resilient and/or highly valued resource soil types.

Riverbank erosion in the immediate vicinity of the Pohono Bridge would continue to occur. Given the localized nature of this erosion, and the soil in this area being classified as "other", this represents a long-term, negligible but adverse impact to soils in this area.

Cumulative Impacts: Although Alternative 3 would improve roadside drainage in the vicinity of culverts and help promote natural sedimentation processes and the development of a natural soil structure and profile, implementation of this alternative would not provide curbing and/or placement of barrier stones to help prevent vehicles from encroaching on areas where soils have been identified as highly valued resource soils. Additionally, Alternative 3 would not help to improve areas where poor drainage has contributed to localized river bank erosion adjacent to Pohono Bridge. Therefore, cumulative actions considered in conjunction with actions called for under Alternative 3 would have an overall negligible impact on soils in Yosemite Valley.

Impairment: Impacts to soils associated with Alternative 3 would be localized, long-term, minor and beneficial along and adjacent to portions of the Yosemite Valley Loop Road. Alternative 3 would not impair soil resources of the park for future generations.

Hydrology, Floodplains, and Water Quality

Affected Environment

Hydrology: Yosemite Valley has a number of major surface water features, including the Merced River and some of the tallest waterfalls in the world. The Yosemite Valley watershed includes Yosemite Valley and its tributary areas. The main tributaries to the Merced River in Yosemite Valley are Tenaya Creek, Illilouette Creek, Yosemite Creek, and Bridalveil Creek. The average daily discharge rate measured at Happy Isles Gauging Station at the base of the upper Merced River watershed and the beginning of the Yosemite Valley watershed is approximately 355 cubic feet per second (cfs), and the average annual total discharge is approximately 257,400 acre-feet (USGS 1998). At Pohono Bridge, where Yosemite Valley ends and the Merced River enters the narrow, V-shaped Merced River gorge, the overall Merced River basin encompasses 205,000 acres (321 square miles) (USGS 1999). Historic flow measurements in the river at the Pohono Bridge Gauging Station have ranged from a high of about 25,000 cfs to a low of less than 10 cfs. The mean daily discharge is about 600 cfs, with an average annual total discharge of approximately 435,000 acre-feet (NPS 1978).

During the most recent period of glaciation in Yosemite Valley, a glacier extended to approximately the location of Pohono Bridge. Following glacial retreat, Lake Yosemite developed and eventually filled with sediment from the El Capitan moraine to upstream of Happy Isles (Huber 1989). The resulting Valley floor has a very mild slope and is responsible for the meandering pattern of the present-day river. The Yosemite Valley segment of the Merced River is characterized by a meandering river, world-renowned waterfalls, an active flood regime, oxbows, unique wetlands, and fluvial processes. The Merced River has a relatively mild slope, with an average of 0.1% through Yosemite Valley (USGS 1992). The Merced River is an alluvial river within Yosemite Valley, and the bed and banks of the channel are composed of smaller sediments, cobbles, and soil layers. This condition makes for a dynamic river that alters its course periodically by eroding and depositing bed and bank material. In most locations, the river flows through a shallow channel approximately 100 to 300 feet wide. In the middle of Yosemite Valley, the river has the capacity to vary between the 2- and 5-year flow within the existing channel banks (NPS 1997a).

Alluvial Processes: Yosemite National Park is composed of and underlain by various granite rock types. As a result, weathering, erosion, and transport of sediment can be very slow processes. Areas of the park have significant soil layers where clays, silts, and organic debris have accumulated with the gravels and sands of the decomposed bedrock. These soils are subject to erosion and alluvial processes.

Sedimentation is a significant process within Yosemite Valley. As noted, the Merced River has a very low gradient within the Valley, approximately 0.1%, or 6.25 feet per mile (NPS 1992). This low gradient allows for significant sediment deposition within Yosemite Valley and the formation of the meandering Merced River through this reach. River impoundments such as bridges and dams tend to alter the sediment distribution and formative streamflows, thereby disrupting the natural alluvial processes.

Floodplains: Yosemite Valley has a well-developed floodplain, with major roads and structures along or within both sides of the floodplain. The character of the floodplain varies in different locations because of local hydraulic controls. The 100-year floodplain (the area along the river corridor that would receive flood waters during a 100-year flood event) is typically used to define the general floodplain boundary. A 100-year flood event is one that has a 1% chance of occurring in any given year.

The Merced River watershed has had 11 winter floods since 1916 that have caused substantial damage to property. All of these floods took place between November 1 and January 30. The January 1997 flood was the largest recorded within the park; it was estimated to have a recurrence interval of 90 years (NPS 1997a). The flood inundated roads, picnic areas, park offices, and lodging units. The U. S. Geological Survey estimated that the flood had a peak discharge of 10,000 cfs at Happy Isles and 25,000 cfs at Pohono Bridge (Eagan 1998).

Actions proposed by the Yosemite Valley Loop Road Project do not call for new facilities or structures in the floodplain of the Merced River other than new culverts beneath the road as shown on figure II-3. Therefore, a Floodplain Statement of Findings is not required for this project.

Water Quality: Water quality throughout Yosemite National Park is considered to be good and generally above state and federal standards. The state of California considers the surface water quality of most park waters to be beneficial for wildlife habitat, freshwater habitat, contact and noncontact recreation, canoeing, and rafting, as indicated in the Central Valley Regional Water Quality Control Board's Water Quality Control Plan (CVRWQCB 1998). An inventory of water quality data performed by the National Park Service indicated excellent conditions in many parts of the park, but some water quality degradation was noted in areas of high visitor use (NPS 1994a).

As part of the park's User Capacity Management Program, a water quality sampling program has been established for the Merced Wild and Scenic River. Water quality sampling from June through October 2004 revealed decreasing concentrations of nitrate and dissolved nitrogen compounds and fecal coliform as water levels declined and water temperatures increased through the summer. During the same period, total phosphorous and dissolved phosphorous concentrations increased. Nutrient concentrations were all quite low with respect to state drinking water standards and below the detection limit of many standard analytical methods. In Yosemite Valley, fecal coliform levels were well below state standards for recreational contact. Also, no petroleum hydrocarbons were detected during this period (NPS 2005a).

Actions called for by the Yosemite Valley Loop Road Project improve hydrologic connectivity, value, and function of adjacent meadow wetland areas. Therefore a Wetland Statement of Findings is not required for this project.

Environmental Consequences – Methodology

Impacts to hydrology, floodplains and water quality were assessed in terms of the duration, intensity, type, and context as discussed below.

Duration of Impact: Short-term impacts occur during the alternative's implementation and are usually considered to be less than 2 years in duration (e.g., construction-related). Long-term impacts remain after the alternative has been implemented and are usually longer than 2 years in duration.

Intensity of Impact: Negligible impacts would be imperceptible or not detectable. Minor impacts would be slightly perceptible and localized, without the potential to expand if left alone. Moderate impacts would be apparent and have the potential to become larger. Major impacts would be substantial, highly noticeable, and may be permanent.

Type of Impact: Adverse impacts alter natural hydrologic conditions (e.g., impede flood flows, cause unnatural erosion or deposition, etc.) or degrade water quality (e.g., increase pollution or bacteria levels from recreational use). Beneficial impacts are those that restore natural hydrologic conditions (e.g., remove impediments to flood flows, stabilize riverbanks, etc.) or improve water quality.

Context of Impact: Localized impacts would occur in the immediate vicinity of an action or in a nearby area indirectly affected by the action.

Environmental Consequences of Alternative 1 (No Action)

The rehabilitation, restoration and resurfacing of the Yosemite Valley Loop Road would not occur under Alternative 1. Although periodic road maintenance and cleaning of culverts would continue to occur, areas of poor drainage from one side of the road to the other, and poorly placed or inadequately sized culverts would continue to impede natural surface and near-surface hydrologic flow, particularly during spring and early summer when surface and near-surface flows peak. The natural hydrologic connectivity of some meadows, wetlands and natural drainages would continue to be adversely affected, particularly in more sensitive areas such as Bridalveil and El Capitan Meadows and the Sentinel Creek area. This represents a localized, long-term, minor to moderate, adverse impact to natural hydrologic processes and the overall functional value of adjacent floodplain and meadow areas.

The expansion of informal roadside parking which results in a steadily increasing number and size of roadside turnouts would continue to occur under Alternative 1. In many of the informal roadside parking areas, road shoulders are deteriorating and the parking area is in poor repair. Vehicles would continue to park in these areas in an *ad hoc* manner, resulting in expansion and encroachment into sensitive meadow and floodplain areas such as the Wosky Pond area, the Teddy Roosevelt and Fern Spring turnout areas, and along the El Capitan Straight. This represents a localized, long-term, minor to moderate, adverse impact to the overall functional value of adjacent floodplain and meadow areas.

River bank erosion adjacent to the Pohono Bridge resulting from improper roadside drainage would continue, and the protective embankment along approximately 150 feet of the Merced

River adjacent to the Valley View turnout, a Class A Scenic Vista, would continue to fail, resulting in localized, long-term, minor, adverse impacts to Merced River water quality.

Cumulative Impacts: The Merced Wild and Scenic River has been affected by a variety of human impacts over time that have introduced obstructions into the river channel, modified the floodplain, and adversely affected water quality. Alterations to hydrology have occurred through development and use within the Merced River corridor since Euro-American settlement. Examples of actions that have had adverse effects on the hydrologic processes of the Merced River include placement of riprap, removal of large woody debris, and construction of bridges, dikes, flood walls, impoundments, dams, and buildings. Conversely, more recent actions such as riverbank restoration projects, removal of impoundments and bridges, and limitations on visitor use of particular areas has helped restore the natural river flow and reduce bank erosion.

Reasonably foreseeable future projects that would have beneficial impacts on hydrologic processes and water quality include restoration actions identified in the *Yosemite Valley Plan* (NPS 2000a). Elements of the *Yosemite Valley Plan* include removal of Sugar Pine Bridge, which constrains flows of the Merced River, rehabilitation of the Yosemite Falls corridor, restoration of campgrounds within the floodplain to natural meadow conditions, and removal of facilities from the 100-year floodplain. Alternatively, construction of additional lodging, campsites, and a visitor transit center in the Valley could have adverse impacts on hydrology, floodplains, and water quality. Overall, the effect of implementation of projects identified in the *Yosemite Valley Plan* (NPS 2000a) would have a long-term, beneficial effect on river hydrologic processes, floodplains and water quality.

The *Revised Merced River Plan* protects river-related natural resources through the application of management elements, including the River Protection Overlay, management zoning, protection and enhancement of Outstandingly Remarkable Values, Section 7 determination process, and implementation of the VERP framework.

Other past projects include the Lower Yosemite Falls Project, Cascades Dam Removal, Happy Isles Dam Removal, Happy Isles to Vernal Falls Trail Reconstruction, and the Eagle Creek/ Merced River Ecological Restoration (Yosemite Valley). Cumulatively, these projects have had beneficial impacts on hydrologic processes and water quality of the Merced River.

While some of the past, present, and reasonably foreseeable future projects along the Merced River in Yosemite Valley would ultimately remove constrictions to streamflows, enhance water quality, rehabilitate eroded streambanks, and reduce degradation of stream characteristics in the Merced River, others would result in adverse water quality impacts and bank erosion. Thus, the cumulative projects would result in a local, long-term, minor, beneficial impact to hydrologic processes and water quality. Alternative 1 would reduce this beneficial impact to some degree by not providing improvements to the culverts and roadside drainages, or improving the hydrologic connectivity in some meadow areas.

The past, present, and future projects in Yosemite Valley, considered cumulatively with Alternative 1, would have a local, long-term, negligible, beneficial effect on hydrologic processes, floodplains and water quality in Yosemite Valley.

Impairment: Impacts to hydrology, floodplains, and water quality associated with Alternative 1 are expected to be localized, minor to moderate and adverse. Alternative 1 would not impair the hydrologic resources of the park for future generations.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

The Yosemite Valley Loop Road would undergo rehabilitation, restoration and resurfacing under Alternative 2. Improvements to existing roadside drainages, coupled with the rehabilitation, proper sizing, and/or location of new culverts would serve to improve surface flow from one side of the road to the other. In addition, the placement of a permeable subgrade beneath the road in the vicinity of Sentinel Creek drainage and El Capitan Straight is expected to improve near-surface flow and overall hydrologic connectivity in these sensitive wetland and floodplain areas, particularly during spring and early summer when water levels are high. Improvements to the roadway and adjacent roadside drainages would provide a localized, long-term, moderate, beneficial impact to surface and near-surface hydrologic processes and the overall functional value associated with these important meadow and floodplain areas.

Improvements to roadside parking areas, such as turnout resurfacing, obliteration and delineation through the placement of curbing and barrier stones to prevent the continued expansion and encroachment into sensitive resource areas, is expected to provide a localized, long-term, minor to moderate, beneficial impact along sections of the Yosemite Valley Loop Road. Areas that would be particularly impacted by these improvements are the Wosky Pond area, the Teddy Roosevelt and Fern Spring turnouts, and the El Capitan Straight.

The area of river bank erosion that has resulted from poor roadside drainage adjacent to the Pohono Bridge would be rehabilitated and restored. In addition, the reinforced embankment adjacent to the Valley View turnout would be repaired to enhance the 'free flowing condition' of the Merced Wild and Scenic River. These actions would provide a localized, long-term, minor, beneficial impact to Merced River water quality.

Cumulative Impacts: Although Alternative 2 improves roadside drainage and natural hydrologic flow in the vicinity of culverts and the El Capitan Straight, overall past, present and reasonably foreseeable cumulative actions would be generally the same as those described for Alternative 1. These would represent a net long-term, minor, beneficial impact on hydrology, floodplains and water quality of the Merced River corridor through Yosemite Valley.

Impairment: Impacts to hydrology, floodplains, and water quality associated with Alternative 2 are expected to be localized, minor to moderate and beneficial. Alternative 2 would not impair the hydrologic resources of the park for future generations.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Under Alternative 3, the improvements to the roadway and adjacent roadside drainages would be the same as identified for Alternative 2. However, the permeable subgrade would not be installed beneath the road along the Sentinel Creek drainage area and El Capitan Straight as part of this alternative. This would result in continued poor hydrologic connectivity in these areas, a long-term, minor to moderate, adverse impact to natural hydrologic processes and the overall functional value of these sensitive floodplain and meadow resources.

The impacts associated with the expansion of informal roadside parking which results in a steadily increasing number and size of roadside turnouts would be the same as those discussed under Alternative 1. Similarly, the impacts associated with river bank erosion adjacent to the Pohono Bridge resulting from improper roadside drainage, and approximately 150 feet of protective embankment along the Merced River adjacent to the Valley View turnout, a Class A Scenic Vista, would be the same as those discussed under Alternative 1.

Cumulative Impacts: Although implementation of Alternative 3 would only improve roadside drainage and natural hydrologic flow in the vicinity of culverts along the Yosemite Valley Loop Road, overall past, present and reasonably foreseeable cumulative actions would be generally the same as those described for Alternative 1. These would represent a net long-term, minor, beneficial impact on hydrology, floodplains and water quality of the Merced River corridor through Yosemite Valley.

Impairment: Impacts to hydrology, floodplains, and water quality associated with improvements to the roadway and adjacent roadside drainages are expected to be minor to moderate and beneficial. However, Alternative 3 would have localized, minor to moderate and adverse impacts related to the continued expansion and encroachment of turnouts adjacent to sensitive resource areas such as meadows and floodplains, and localized, minor, adverse impacts to Merced River water quality. Alternative 2 would not impair the hydrologic resources of the park for future generations.

Wetlands

Affected Environment

Wetland Classification and Definition: Wetlands are transitional areas between terrestrial and aquatic ecosystems, where water is usually at or near the surface or the land is covered by shallow water. Wetlands have many distinguishing features, the most notable of which are the presence of standing water, unique soils, and vegetation adapted to or tolerant of saturated soils (Mitsch and Gosselink 1993). Wetlands are considered highly valued resources because they perform a variety of hydrologic and ecological functions vital to ecosystem integrity.

The National Park Service classifies and maps wetlands using a system created by the U.S. Fish and Wildlife Service that is referred to as the Cowardin classification system (USFWS 1979). This system classifies wetlands based on vegetative cover and life form, flooding regime, and substrate material. Jurisdictional wetlands are delineated and classified to meet regulations of Section 404 of the Clean Water Act. Cowardin wetlands include jurisdictional wetlands but may also include certain nonvegetated sites lacking soil if they meet specific criteria.

Wetlands within the Project Area: Wetlands in Yosemite Valley are formed in low-gradient lands adjacent to the Merced River, its tributaries, or other bodies of water that are, at least periodically, influenced by flooding or high water tables. These wetlands would be broadly identified as riverine (Merced River), palustrine (riparian, tributaries, shallow ponds, meadows, and marshes), and undesignated (USFWS 1995).

Specific wetland classes within the project area include the following:

- *Riverine* – includes all wetland and deepwater habitats contained within a river channel, except wetlands dominated by trees, shrubs, persistent emergent mosses, or lichens

- *Palustrine emergent* – includes meadows, marshes, and vegetated ponds. Characterized by erect, rooted, herbaceous hydrophytes, such as ferns, that are usually present for most of the growing season.
- *Palustrine forest* – riparian forest habitat that is regularly inundated by normal high-water flows or flood flows. The dominant woody vegetation is at least 20 feet tall.
- *Palustrine scrub shrub* – dominated by woody vegetation less than 20 feet tall, such as willows

Environmental Consequences – Methodology

The results from wetland delineations conducted in Yosemite Valley in 2002 and 2003 and the Yosemite Valley vegetation cover map (NPS 1994b) were used to evaluate impacts on wetlands. These results, which indicate the location of wetlands were compared to each action alternative to determine the area of potential impact.

The wetland protection statutes that guide the National Park Service include Executive Order 11990, Protection of Wetlands; *Director's Order #77-1, Wetland Protection,* and its accompanying Procedural Manual #77-1; Clean Water Act Sections 10 and 404; and the "no net loss" goal outlined by the White House Office on Environmental Policy in 1993. Executive Order 11990 requires agencies to minimize the destruction, loss, or degradation of wetlands. The National Park Service's *Director's Order #77-1* and *Procedural Manual #77-1* provides specific procedures for carrying out Executive Order 11990. Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act authorize the U.S. Army Corps of Engineers to grant permits for construction and disposal of dredged material in waters of the United States. This analysis considers whether proposed actions could breach applicable federal laws, regulations, or executive orders.

Impacts to wetlands were assessed in terms of duration, type, and intensity of impact, as discussed below. Unless otherwise noted, local impacts were considered to be those that occur in the immediate vicinity of an action or in a nearby area indirectly affected by the action.

Duration of Impact: The expected duration of impacts has been defined as long-term or short-term. Short-term impacts would last up to 20 years following the implementation of an alternative, and long-term impacts would last longer than 20 years after implementation of an alternative.

Intensity of Impact: Three primary measures were used to evaluate the intensity of impacts on wetlands: the size and type of the wetland, the integrity of the wetland, and the connectivity of the wetland to adjacent habitats. The intensity of impacts have been described as negligible, minor, moderate, or major according to the criteria described below.

- Negligible: imperceptible or not detectable
- Minor: slightly detectable; localized within a small area; would not affect the overall viability of wetlands in the park
- Moderate: apparent; have the potential to become major impacts
- Major: would be substantial, highly noticeable, and could become permanent

Type of Impact: Adverse impacts would degrade the size, integrity, or connectivity of wetlands. Conversely, beneficial impacts would enlarge the size or enhance the integrity and connectivity of wetlands.

Environmental Consequences of Alternative 1 (No Action)

Alternative 1 would maintain existing culverts and roadside drainages in their current condition along the Yosemite Valley Loop Road. Improperly sized and poorly placed culverts would continue to impede natural hydrologic flow/processes adversely affecting adjacent wetland areas. Areas that are adversely impacted by inefficient drainage systems include the Bridalveil braided stream, the Sentinel Creek drainage, and El Capitan meadow area. Under Alternative 1, these wetland areas would continue to experience long-term impacts due to impedance of natural surface and near-surface flows between areas bisected by the road. Informal roadside parking would continue to encroach upon sensitive wetlands along portions of the road under Alternative 1. Alternative 1 would also continue the maintenance of the existing Yosemite Valley Loop Road, including those stretches that pass through wetland areas. Direct and indirect impacts to wetland and aquatic habitats could occur as a result of routine maintenance and repair of the road and associated drainage facilities over time, as well as from use of informal roadside parking areas.

Overall, impacts to wetlands and aquatic habitats along the Yosemite Valley Loop Road associated with Alternative 1 are expected to have long-term, localized, minor, adverse effects on the size, integrity, and connectivity of wetlands and adjacent aquatic habitats throughout the project area.

Cumulative Effects: Wetland and riparian systems of the Merced River corridor have been previously altered by development and visitor activities. These changes have influenced the size, form, and function of wetlands and the plants, wildlife, and aquatic species that inhabit them. Current and reasonably foreseeable future actions within Yosemite Valley are considered to have an overall beneficial effect on wetlands. For example, the *Revised Merced River Plan* protects river-related natural resources through the application of management elements, including the River Protection Overlay, management zoning, protection and enhancement of Outstandingly Remarkable Values, and implementation of the VERP framework as part of the park's overall User Capacity Management Program for the Merced River corridor.

Full implementation of the *Yosemite Valley Plan* would result in a net gain of 118 acres of wetlands in Yosemite Valley through actions such as restoration of the former Upper and Lower River Campgrounds and a portion of Lower Pines Campground to natural conditions; removal of roads through Stoneman and Ahwahnee Meadows; and removal of other bridges (e.g., Sugar Pine and possibly Stoneman) affecting the natural flow of the Merced River. Farther downstream, removal of the Cascades Diversion Dam removed an unnatural constriction to the free flow of the Merced River, thereby enhancing natural river dynamics and aquatic systems below Yosemite Valley. Some *Yosemite Valley Plan* (NPS 2000a) projects, such as construction of a replacement footbridge at the Happy Isles area, construction of a vehicle bridge across Yosemite Creek near Yosemite Lodge, and expansion of some campgrounds in Yosemite Valley, have the potential to adversely affect local wetlands. However, these projects would be designed to ensure the long-term protection of wetlands consistent with the *Revised Merced River Plan*, the Clean Water Act, and Executive Order 11990: Protection of Wetlands.

Past, present and reasonably foreseeable future actions would be expected to have a long-term, minor to moderate, beneficial impact on wetlands within Yosemite Valley. These cumulative actions, in combination with Alternative 1, would continue to have a long-term, minor to moderate, beneficial impact on wetlands in Yosemite Valley.

Impairment: Alternative 1 would result in local, short and long-term, minor, adverse effects to wetland and aquatic habitats due to the existing state of the Yosemite Valley Loop Road and drainage systems. These short-term effects would not impair the park's wetland resources for future generations.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

The Yosemite Valley Loop Road corridor has been previously disturbed by transportation facilities and other development activities in its immediate vicinity. As such, impacts to wetlands under Alternative 2 are expected to be negligible to minor and limited to localized areas adjacent to the existing road prism. Implementation of Alternative 2 would impact wetland communities as described below:

- Improvements to culverts would allow for the restoration of more natural surface and near-surface hydrologic processes, enhancing wetland and aquatic habitats along the roadway.
- Installation of a permeable subgrade beneath the roadway in the vicinity of Sentinel Creek drainage and El Capitan Straight, two areas prone to seasonal flooding, would contribute to improved hydrological processes and enhancement of wetland communities adjacent to the roadway in these areas.
- Placement of roadside barriers and formalization of roadside parking areas would help to protect wetland communities adjacent to the roadway that are potentially encroached upon by visitor use.

The proposed improvements to the Yosemite Valley Loop Road drainage facilities included in Alternative 2 are expected to have long-term beneficial effects on wetland and aquatic habitats through restoration of more natural subsurface water flows throughout wetlands areas and between wetlands and the river. Thus, although construction activities are expected to result in localized, short-term, minor, adverse impacts to wetland and aquatic habitats along the roadway, overall local, long-term, minor to moderate, beneficial impacts are expected to wetland and aquatic habitats in these areas.

Cumulative Effects: Although Alternative 2 would contribute to improved roadside drainage and natural hydrologic flow in the vicinity of culverts, the Sentinel Creek drainage area and El Capitan Straight, overall past, present and reasonably foreseeable cumulative actions would be generally the same as those described for Alternative 1. These would represent a net long-term, minor to moderate, beneficial impact to wetlands in Yosemite Valley.

Impairment: Alternative 2 would result in local, short-term, minor, adverse effects on wetlands and aquatic resources from construction activities and local, long-term, minor to moderate, beneficial effects on wetland and aquatic resources due to the rehabilitation of existing culverts, addition of new culverts, and installation of a permeable subgrade in areas prone to seasonal flooding. This alternative would not impair the wetland and aquatic resources of the park.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Implementation of Alternative 3 would impact wetlands to the same extent as described for Alternative 2 above, with the following exceptions:

- The proliferation of informal roadside parking areas would continue to occur under this alternative, potentially impacting vegetation in wetland areas.

- Hydrologic flow in wetland and aquatic communities adjacent to the roadway would not be enhanced by the installation of a permeable subgrade in areas prone to seasonal flooding.
- Construction activities would be of a shorter duration due to the reduction in improvements to roadside parking areas and hydrology as described above.

Unless implementation of the VERP framework determines that unacceptable levels of visitor use are related to the presence of informal parking areas along the roadway, visitor traffic would continue to potentially impact wetland communities in and adjacent to these areas. In summary, implementation of Alternative 3 would result in localized, minor, long-term, beneficial impacts to wetlands along the Yosemite Valley Loop Road.

Cumulative Effects: Although Alternative 3 only improves roadside drainage and natural hydrologic flow in the vicinity of culverts, overall past, present and reasonably foreseeable cumulative actions would be generally the same as those described for Alternative 1. These would represent a net long-term, minor to moderate, beneficial impact to wetlands in Yosemite Valley.

Impairment: Alternative 3 would result in local, short-term, minor, adverse effects on wetlands and aquatic resources from construction activities and local, long-term, minor, beneficial effects on wetland and aquatic resources due to the restoration of more natural surface water flow in those areas. This alternative would not impair the wetland and aquatic resources of the park for the use and enjoyment of future generations.

Vegetation

Affected Environment

Yosemite Valley is in the lower montane, mixed conifer vegetation zone, where 41 vegetation types have been identified (NPS 1994b). These have been loosely combined into five groupings:

- *Upland*: Upland areas are characterized by mixed conifer and hardwood forests, usually dominated by canyon live oak, ponderosa pine, incense-cedar, sugar pine, Douglas-fir and Mariposa manzanita.
- *California black oak*: California black oak communities are characterized by open stands of large, stately trees that form bands or rings around the Valley floor between upland forest communities and the lower-lying meadow and riparian communities.
- *Meadow*: Low-elevation meadows along the Merced River in Yosemite Valley are hydrologically driven communities that connect drier upland/black oak communities with lower riparian zones.
- *Riparian*: Riparian zones extend outward from the banks of the Merced River and its tributaries and are characterized by broadleaf deciduous trees such as white alder, black cottonwood, and willow species.
- *Other*: Developed areas, talus slopes, and rockfall zones comprise the 'Other' category in this analysis.

The extent of each of these communities throughout Yosemite Valley is depicted below in figures III-3 and III-4.

Placeholder for Figure III-3. (West Valley vegetation types). Click here to open.

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Placeholder for Figure III-4. (East Valley vegetation). Click here to open.

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The existing road corridor bisects each of the five vegetation communities to the extent outlined in table III-3 below.

Table III-3
Vegetation Classes Bisected by the Yosemite Valley Loop Road

Vegetation Community	Percent Cover Bisected by Yosemite Valley Loop Road
Upland	78%
California Black Oak	2%
Meadow, Floodplain	8%
Riparian	11%
Other	1%

Source: NPS GIS Laboratory

Although meadow and riparian areas only account for about 19% of the area bisected by the length of the Yosemite Valley Loop Road, these communities are highlighted because of their sensitivity and critical role in the Merced River ecosystem. Meadow and riparian communities are among the most productive and biologically diverse in Yosemite Valley, as well as the most impacted due to their proximity to water and the effects of trampling and above and below ground infrastructure.

Non-Native Species: As a result of human impacts to plant communities, many non-native species have become established in Yosemite Valley meadows. Non-native grasses, planted intentionally at the turn of the century for agricultural purposes, remain the dominant species in the drier portions of most meadows. Bull thistle and Himalayan blackberry are other examples of non-native species that have proven their ability to invade and out-compete native vegetation. In general, non-native species alter the composition of meadow ecosystems, out-compete native species, and may reduce regional species diversity. Control and preventive measures are in place for many of these invasive species (NPS 2004).

Root Rot: Annosus root disease is a widespread native fungus occurring throughout northern Europe and western North America in coniferous forests. In pines, the fungus first spreads through the root system, attacking and eventually killing the inner bark and sapwood of infected trees. Within two to six years after initial infection, the tree can die, with the fungus remaining active as a saprophytic, wood-decaying organism within roots and the butt of the dead tree (NPS 2000a).

In Yosemite Valley, the extent of infection of annosus root disease is unusually large; only a few other large population centers of this species occur on the western side of the Sierra Nevada. The Valley has dense stands of large trees on a sandy floor, a high water table, and frequent flooding. Several centers of significant infestation are present in the Valley today, including former Upper and Lower River Campgrounds, Yellow Pines Campground, Sentinel Beach Picnic Area, portions of Yosemite Lodge, and most of the Taft Toe area (figure III-5). Existing annosus disease centers in developed areas can be mitigated by landscaping with native species that are not susceptible to infection, such as California black oak, live oak, and big-leaf maple (NPS 2000a).

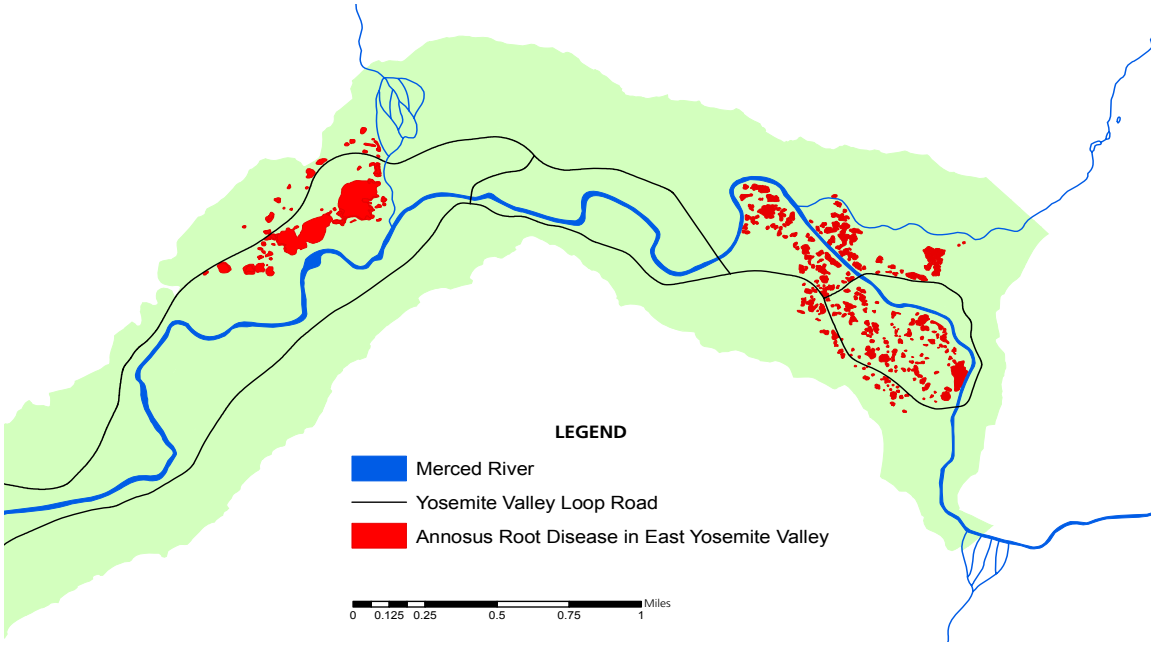

Figure III-5. The Extent of Annosus Root Disease in the East Valley, YNP. Source: NPS GIS Laboratory

In select locations along the Yosemite Valley Loop Road large trees (DBH greater than 12"), such as the one pictured below (Figure III-6), currently impede natural hydrologic processes and/or serve as obstructions to traffic safety and park operations.

Environmental Consequences – Methodology

Impacts to vegetation communities were assessed in terms of duration, type, and intensity of impact, as discussed below. Unless otherwise noted, local impacts were considered to be those that occur in the immediate vicinity of an action or in a nearby area indirectly affected by the action.

Duration of Impact: Long-term impacts are defined as those that can be detected for longer than 20 years. Short-term impacts are defined as those lasting less than 20 years.

Intensity of Impact: The intensity of impacts on vegetation was evaluated by determining the extent to which the road corridor passes through each vegetation community. This approach was deemed sufficient since proposed project actions will remain within the existing development footprint of the road corridor.

Figure III-6. Large oak tree leaning over the Yosemite Valley Loop Roadway that has been damaged by plows and large trucks. (NPS Photo)

- Negligible impacts would have no measurable or perceptible changes in plant community size, continuity, or integrity.
- Minor impacts would be measurable or perceptible and localized within an isolated area and the overall viability of the plant community would not be affected.
- Moderate impacts would cause a change in the plant community (e.g., size, continuity, and integrity); however, the impact would remain localized. The change would be measurable and perceptible, but could be reversed.
- Major impacts would be substantial, highly noticeable, and could be permanent in their effect on plant community size, diversity, continuity, or integrity.

Natural processes, such as flooding, sustain many plant communities. This impact analysis considered whether changes would occur to opportunities for natural processes to take place. For example, in areas where proposed work may affect the hydrology of a system, impacts were analyzed to assess changes to the distribution, composition and diversity of associated communities.

Non-native species can alter soil chemical and physical properties, hamper native species establishment, and ultimately alter native plant community structure and function. This impact analysis considered whether proposed actions would favor the establishment of non-native species, as well as the ability to contain and reverse non-native plant infestation.

Type of Impact: Impacts were classified as adverse if they would reduce the size, continuity, or integrity of a plant community. Conversely, impacts were classified as beneficial if they would increase the size, continuity, or integrity of a plant community.

Environmental Consequences of Alternative 1 (No Action)

Under Alternative 1, the overall condition of the Yosemite Valley Loop Roadway would continue to be addressed on an 'as need be' basis, through localized pothole repair and patch resurfacing. Roadside parking would continue to occur in an informal manner along portions of the Yosemite Valley Loop Road and poor and inadequate roadside drainage would continue to degrade habitat connectivity in localized areas. Vegetation communities most affected by poorly draining water along the roadway would be California black oak, meadow/floodplain, and riparian areas, all of which are identified as highly valued resources in Yosemite Valley. Encroachment upon vegetation through the proliferation of informal roadside parking in some areas would continue to occur under this alternative. In addition, sustained areas of high water due to poor roadside drainage during periods of seasonal flooding as a result of poorly maintained and placed culverts would continue to contribute to ecological conditions that support the survival of annosus root disease in some areas. These factors would combine to result in a localized, minor, long term, adverse impact to vegetation in Yosemite Valley under Alternative 1.

Cumulative Impacts: Vegetation in Yosemite Valley has been previously altered by development and visitor activities. These changes have influenced the size, form, and function of vegetation communities and the plants and wildlife that inhabit them. Cumulative impacts from future actions would be mixed, combining both adverse and beneficial effects. Cumulative beneficial impacts on vegetation include restoration and rehabilitation projects, and ecosystem management. Cumulative adverse impacts would be related to increased facilities and visitor demand.

Reasonably foreseeable future actions within Yosemite Valley are considered to have an overall net benefit to vegetation. For example, the *Revised Merced River Plan* protects river-related natural resources through the application of management elements, including the River Protection Overlay, management zoning, protection and enhancement of Outstandingly Remarkable Values, and implementation of the VERP framework.

Full implementation of the *Yosemite Valley Plan* would restore approximately 175 acres, of which approximately 160 acres would be highly valued resource vegetation in Yosemite Valley. Such proposed actions include removal and restoration of several former campgrounds; removal of roads through Stoneman and Ahwahnee Meadows; and natural vegetation restoration actions in several areas. Although certain *Yosemite Valley Plan* (NPS 2000a) projects (such as construction of new parking and lodging facilities, and expansion of campgrounds in Yosemite Valley) have the potential to adversely affect local vegetation, these projects would be designed to ensure the long-term protection of sensitive vegetation communities consistent with the *Revised Merced River Plan* and the park's *Vegetation Management Plan*.

Cumulative actions could have a long-term, minor, beneficial cumulative effect on vegetation within Yosemite Valley due to the significant restoration efforts identified in the *Yosemite Valley Plan* (NPS 2000a). Although Alternative 1 would result in localized, short-term and long-term, minor, adverse effects, when combined with past, present, and reasonably foreseeable future actions, there is still expected to be a net long-term, minor, beneficial effect on vegetation patterns.

Impairment: Alternative 1 would result in localized, short and long-term, minor, adverse impacts to vegetation due to routine repair and maintenance activities of the Yosemite Valley Loop Road. Therefore, Alternative 1 would not impair the park's vegetation resources for future generations.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

The entire Yosemite Valley Loop Road corridor proposed for project construction has been previously disturbed by transportation facilities and other development activities. As such, impacts to vegetation under Alternative 2 would be relatively minor and limited to areas adjacent to the existing road prism, except where specifically noted. Implementation of Alternative 2 would impact vegetation communities as described below:

- Improvements to culverts would allow for the restoration of more natural surface and near-surface hydrologic processes, enhancing meadow, riparian, and other wetland and aquatic habitats along the roadway.
- Installation of a permeable subgrade beneath the roadway in the vicinity of Sentinel Creek drainage and El Capitan Straight, two areas prone to seasonal flooding, would contribute to improved hydrological processes and enhancement of vegetation communities in these areas. California black oak communities along the roadway that presently experience long periods of seasonal standing water would especially benefit from improved hydrological conditions.
- Placement of roadside barrier stones and formalization of roadside parking areas would help to protect vegetation communities adjacent to the roadway that are potentially encroached upon by visitor use.
- Removal of select trees and brush clearing of smaller woody vegetation along segments of the roadway would be necessary to accommodate repaving, improvements to culverts, and installation of a permeable subgrade in 2 locations. It is estimated that no more than 5 trees of

DBH greater than 12" and less than 36" would be removed, including one California black oak and one alder tree. No trees identified for removal are snags, nor special species of concern.

Implementation of Alternative 2 would disturb vegetation in the vicinity of construction activities resulting in localized, short-term, minor, adverse impacts to communities bisected by the Yosemite Valley Loop Road. However, the benefits of enhanced hydrologic flow due to improvements to drainages along the roadway would outweigh the effects of vegetation removal. In summary, the actions described above would combine to result in localized, long-term, minor, beneficial impacts to vegetation throughout Yosemite Valley.

Cumulative Impacts: Although Alternative 2 would contribute to improved roadside drainage and natural hydrologic flow in the vicinity of culverts, the Sentinel Creek drainage area, and El Capitan Straight, overall past, present and reasonably foreseeable cumulative actions would be generally the same as those described for Alternative 1. These would represent a net long-term, minor beneficial impact to vegetation patterns in Yosemite Valley.

Impairment: Alternative 2 would help to protect and enhance high value habitat areas along the Yosemite Valley Loop Roadway through the formalization of roadside parking areas and the improvement of drainage facilities adjacent to the roadway. Areas of resource encroachment would be minimized and natural hydrologic processes restored, resulting in long-term, minor, beneficial impacts to vegetation resources. Alternative 2 would not impair the vegetation resources of the park for future generations.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Implementation of Alternative 3 would impact vegetation to the same extent as described for Alternative 2 above, with the following exceptions:

- The proliferation of informal roadside turnouts would continue to occur under this alternative, potentially impacting vegetation in these areas.
- Hydrologic flow in vegetation communities adjacent to the roadway, especially California black oak forests, would not be enhanced by the installation of a permeable subgrade in areas prone to seasonal flooding, as proposed under Alternative 2.
- Construction activities would be of a shorter duration due to the reduction in improvements to roadside parking areas and hydrology, as described above.

In summary, Alternative 3 would result in localized, negligible, long-term, beneficial impacts to vegetation patterns along the Yosemite Valley Loop Road.

Cumulative Impacts: Although Alternative 3 only improves roadside drainage and natural hydrologic flow in the vicinity of culverts along the Yosemite Valley Loop Road, overall past, present and reasonably foreseeable cumulative actions would be generally the same as those described for Alternative 1. These would represent a net long-term, minor, beneficial impact on vegetation patterns in Yosemite Valley.

Impairment: Alternative 3 would result in localized, negligible, long-term, beneficial impacts to vegetation patterns along the Yosemite Valley Loop Road. As a result, Alternative 3 would not impair the vegetation resources of the park for future generations.

Wildlife

Affected Environment

Wildlife habitats in Yosemite Valley are characterized by vegetation associations with black oak woodlands, lower montane - mixed coniferous forests, a thriving riparian corridor along the Merced River, and low-elevation meadows. Expanses of abundant wildlife habitat are interspersed with concentrated areas of human use, especially in the east end of Yosemite Valley.

Several wildlife habitats are associated with each of the upland, California black oak, meadow/floodplain, riparian, and other vegetation communities found within the project area. A description of those habitat types and the species known to occur within each in Yosemite Valley may be found in the *Revised Merced River Plan SEIS* (NPS 2005a). An overall description of wildlife known to occur in Yosemite Valley is outlined below (for a description of rare, threatened and endangered species, see the Special Status Species section).

Mammals: Mammals resident or transient in Yosemite Valley include California ground squirrel, western grey squirrel, Douglas squirrel, long-eared chipmunk, broad-footed mole, deer mouse, Botta's pocket gopher, ringtail, raccoon, coyote, bobcat, mule deer, mountain lion, black bear, and 18 species of bats.

Fish: Fisheries resources within Yosemite Valley have historically been low in species diversity. Species native to the Merced River within Yosemite Valley probably only included rainbow trout (that migrated into the area from the San Joaquin River) and the Sacramento sucker. More recently, non-native rainbow trout and brown trout have been stocked throughout portions of the Merced River and currently dominate the fisheries of this area. Drainages bisected by the Yosemite Valley Loop Road and supported by culverts and drainage facilities along the road corridor are seasonal and do not sustain fish habitat or populations (NPS 2000a).

Reptiles and Amphibians: Yosemite has a particularly large number of native reptiles and amphibians, most of which occur in meadow and riparian habitats in Yosemite Valley. Species diversity includes: 14 snakes (one poisonous), seven lizards, one turtle, two toads, one tree frog, three true frogs, and five salamanders (including newt and ensatina). Two of the species of true frogs once found in Yosemite Valley are now apparently extinct: the foothill yellow-legged frog and the California red-legged frog. Possible factors in their disappearance include a reduction in perennial ponds and wetlands, and predation by bullfrogs (NPS 2000a).

Birds: Eighty-four bird species are known to nest in Yosemite Valley, 54% of which are uncommon or absent during winter months. Human activity, loss of habitat, and nest parasitism by brown-headed cowbirds serve as the major causes of reduced numbers of several bird species in Yosemite Valley, such as great gray owls, willow flycatchers, and Harlequin ducks. Other species known to occur in Yosemite Valley include: band-tailed pigeon, western wood pewee, red-breasted nuthatch, brown creeper, hermit thrush, ruby-crowned kinglet, yellow-rumped warbler, western bluebird, Steller's jay, acorn woodpecker, Pileated woodpecker, white-headed woodpecker, Hammond's flycatcher, flammulated owl, California spotted owl, great-horned owl, mallard duck, red-winged blackbird, American dipper, belted kingfisher, and several species of swallow (NPS 2000a).

Non-Native Species: Non-native wildlife in Yosemite Valley include several species of trout, wild turkey, brown-headed cowbird, crayfish, and bullfrog (NPS 2000a).

Environmental Consequences – Methodology

Impacts to wildlife and their habitat areas were assessed in terms of duration, type, and intensity of impact, as discussed below. Unless otherwise noted, local impacts were considered to be those that occur in the immediate vicinity of an action or in a nearby area indirectly affected by the action.

The *Yosemite Valley Plan* (NPS 2000a) and the *Revised Merced River Plan SEIS* (NPS 2005a) both provide a description of the process used to assess impacts to wildlife and their habitats.

Duration of Impact: The duration of impacts to wildlife was characterized as short-term or long-term. Short-term impacts would be expected to last for less than 20 years. All short-term impacts to wildlife and habitat from implementation of an alternative would relate to construction activities and their immediate effects on wildlife. These impacts would be expected to end with cessation of construction activity, or soon thereafter. Long-term impacts have been defined as those lasting 20 years or longer.

Intensity of Impact: The intensity of impacts on wildlife was evaluated in the following way:

- Negligible impacts would not be measurable or perceptible.
- Minor impacts would be measurable or perceptible and localized within an isolated area; however, the overall viability of the population or subpopulation would not be affected and without further impacts, negative effects would be reversed and the population would recover.
- Moderate impacts would be sufficient to cause a change in the population or subpopulation (e.g. abundance, distribution, quantity, or viability); however, the impact would remain localized. The change would be measurable and perceptible, but the negative effects could be reversed.
- Major impacts would be substantial, highly noticeable, and could be permanent in their effect on population or subpopulation survival without active management.

Type of Impact: Impacts were classified as adverse if they would negatively affect the size, continuity, or integrity of wildlife habitat, or result in unnatural changes in the abundance, diversity, or distribution of wildlife species. Conversely, impacts were classified as beneficial if they would positively affect the size, continuity, or integrity of wildlife habitat.

Environmental Consequences of Alternative 1 (No Action)

Under Alternative 1, the overall condition of the Yosemite Valley Loop Roadway would continue to be addressed on an 'as need be' basis, through localized pothole repair and patch resurfacing. Parking and roadside activities would continue to occur in an informal manner along portions of the Yosemite Valley Loop Road and poor and/or inadequate roadside drainage would continue to degrade habitat health and connectivity in localized areas.

The greatest impacts to wildlife resulting from Alternative 1 relate to encroachment into sensitive habitat areas by continued expansion of informal roadside parking, and continued impedance of hydrologic flow as a result of poorly maintained drainages adjacent to the roadway. Sensitive wetland and meadow communities are especially vulnerable to impacts related to visitor use of informal roadside turnouts, disturbed hydrologic flow and unnatural erosion regimes. These areas are highlighted because of their critical importance to wildlife throughout Yosemite Valley.

Therefore, Alternative 1 would result in localized, long-term, negligible to minor, adverse impacts to wildlife along the Yosemite Valley Loop Road.

Cumulative Impacts: Certain development projects in the Valley could result in increased disturbance to wildlife, such as the expansion of campgrounds, construction of lodging and employee housing, and utility improvements in some areas as identified in the *Yosemite Valley Plan* (NPS 2000a). However, other *Yosemite Valley Plan* projects related to habitat restoration (such as removal of roads through Stoneman and Ahwahnee Meadows and the Visitor Use and Floodplain Restoration in East Yosemite Valley Project) and designed to restore wet meadow habitats in areas previously developed as campgrounds would have long-term, beneficial impacts to wildlife habitat areas. Although these types of projects may have slight site-specific, short-term, adverse effects (e.g., potential construction activity disturbance of wildlife and habitat areas), the objective of these projects is to restore and manage natural resources and wildlife habitat areas. For example, full implementation of the *Yosemite Valley Plan* would restore approximately 177 acres of habitat. Overall, Alternative 1, in combination with the cumulative projects, would result in local, long-term, minor, beneficial cumulative impacts to wildlife resources.

Impairment: Alternative 1 would result in localized, long-term, negligible to minor adverse impacts to wildlife along the Yosemite Valley Loop Road. Therefore, Alternative 1 would not impair the park's wildlife resources for future generations.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

The entire road corridor proposed for project construction has been previously disturbed by transportation facilities and other development activities. Implementation of Alternative 2 could disturb wildlife in the vicinity of construction activities related to heavy equipment and human intrusion. Five trees and shrubs that could provide roosts, perches, or nest sites may be removed to accommodate construction activities. Overall, these actions could result in direct losses of nests, burrows, and animals, and indirect effects through disturbance of nesting birds or roosting bats. Impacts due to generation of noise and light would result in localized, short-term, minor, adverse effects on native fish and wildlife. These impacts could be lessened by scheduling construction in late fall to decrease impacts to nesting, roosting, and breeding wildlife.

Implementation of Alternative 2 could contribute to the restoration of wildlife habitat areas by enhancing natural surface and subsurface hydrologic processes through culvert improvements and the installation of a permeable subgrade beneath the road in sections prone to seasonal flooding. This proposed work is located in meadow, riparian, and California black oak communities along the roadway, areas which are considered among the highly valued habitats in Yosemite Valley. Impacts to wildlife associated with these habitats would be expected to be long-term, minor, and beneficial in nature. Additionally, rehabilitation and addition of culverts along the roadway may serve to facilitate individual animal movements beneath the road corridor (smaller animals are known to use culverts as safe passages beneath roads).

Alternative 2 would also address existing disturbance regimes to wildlife communities at informal parking areas along the roadway. Implementation of Alternative 2 would help to protect habitat areas adjacent to the road that are presently encroached upon by informal parking and visitor traffic. The use of roadside barriers and formalization of roadside parking areas would contribute to protection of these areas by minimizing disturbance to sensitive resource areas. These actions

would result in localized, long-term, negligible to minor, beneficial impacts to wildlife throughout Yosemite Valley.

Cumulative Impacts: Although Alternative 2 would contribute to improved roadside drainage and natural hydrologic flow in the vicinity of culverts, Sentinel Creek drainage area and El Capitan Straight, potentially enhancing adjacent wildlife habitat in localized areas, overall past, present and reasonably foreseeable cumulative actions would be generally the same as those described for Alternative 1. These would represent a net long-term, minor, beneficial effect to wildlife in Yosemite Valley.

Impairment: Alternative 2 would help to protect and enhance high value habitat areas along the Yosemite Valley Loop Roadway through the formalization of roadside parking areas and the improvement of drainage facilities along the roadway. Areas of resource encroachment would be minimized and natural hydrologic processes restored, resulting in long-term, minor, beneficial impacts to wildlife resources. Therefore, Alternative 2 would not impair the park's wildlife resources for future generations.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Implementation of Alternative 3 would be expected to result in the same impacts described for Alternative 2, with the following exceptions:

- The proliferation of informal roadside turnouts would continue to occur under this alternative, potentially impacting vegetation in these areas.
- Hydrologic flow in wildlife habitat areas adjacent to the roadway, especially California black oak forests, would not be enhanced by the installation of a permeable subgrade beneath the roadway in areas prone to seasonal flooding.
- Construction activities would be of a shorter duration due to the reduction in improvements to roadside parking areas and hydrology, as described above.

As a result, implementation of Alternative 3 would result in localized, long-term, negligible, beneficial impacts to wildlife along the Yosemite Valley Loop Road.

Cumulative Impacts: Although Alternative 3 only improves roadside drainage and natural hydrologic flow in the vicinity of culverts along the Yosemite Valley Loop, overall past, present and reasonably foreseeable cumulative actions would be generally the same as those described for Alternative 1. These would represent a net long-term, minor, beneficial impact on wildlife in Yosemite Valley.

Impairment: Alternative 3 would help to protect and enhance high value habitat areas along the Yosemite Valley Loop Roadway through the formalization of roadside parking areas and the improvement of drainage facilities along the roadway. Areas of resource encroachment would be minimized and natural hydrologic processes restored, resulting in long-term, minor, beneficial impacts to wildlife resources. As a result, Alternative 3 would not impair the wildlife resources of the park for future generations.

Special Status Species

Affected Environment

The Federal Endangered Species Act of 1973, as amended, requires all federal agencies to consult with the U.S. Fish and Wildlife Service before taking actions that could jeopardize the continued existence of species that are listed or proposed to be listed as threatened or endangered, or could result in the destruction or adverse modification of critical or proposed critical habitat. The first step in the consultation process, which was completed in July 2005, is to obtain a list of protected species from the U.S. Fish and Wildlife Service.

In addition, CEQ Regulations for Implementing the National Environmental Policy Act (Section 1508.27) also require the consideration of whether an action may violate federal, state, or local law or requirements imposed for the protection of the environment. For this reason, species listed under the California Endangered Species Act or accorded special status (i.e., considered rare or sensitive) by the California Department of Fish and Game are included in this analysis.

Also included in this analysis are park sensitive species. Park sensitive species[1] are those that have extremely limited distributions in the park and may represent relict populations from past climatic or topographic conditions, are listed by the California Native Plant Society, may be at the extreme extent of their range in the park, or represent changes in species genetics. Park resources are included in this analysis because they could be affected (due to proximity to human-use zones, or susceptibility of individual plants or populations to loss from natural or unnatural events), and their existence is considered when evaluating consequences for any proposed management action.

A total of 39 special-status wildlife species and 46 special-status plant species were considered in the evaluation of this proposed project (table III-4). These species were identified from data gathered from the National Park Service, the U.S. Fish and Wildlife Service (USFWS 2005), the California Natural Diversity Database, and the California Native Plant Society. Special status wildlife species are only known to occur in Yosemite Valley as transient animals, and do not establish long-term breeding or feeding areas within the proposed project area. Special status plant species do occur within Yosemite Valley, but are not located within the proposed project area.

Table III-4 outlines special-status species that are known to occur in Yosemite Valley and which were considered in the evaluation of this proposed project.

[1] The Yosemite National Park sensitive species list applies only to plant species. A separate list for wildlife species has not yet been developed.

Table III-4
Rare, Threatened, and Endangered Species Considered in this Analysis

Species	Status[2] USFWS	State	Park
FEDERALLY LISTED THREATENED OR ENDANGERED SPECIES			
Reptiles and Amphibians			
California red-legged frog *Rana aurora draytonii*	FT	CSC	
Birds			
Bald eagle *Haliaeetus leucocephalus*	FT	CE	
FEDERAL SPECIES OF CONCERN			
Invertebrates			
Wawona riffle beetle *Atractelmis wawona*	FC		
Keeled sideband snail *Monadenia circumcarinata*	FC		
Yosemite Mariposa sideband snail *Monadenia hillebrandi yosemitensis*	FC		
Reptiles and Amphibians			
Mount Lyell salamander *Hydromantes platycephalus*	FC	CSC	
Foothill yellow-legged frog *Rana boylei*	FC	CSC	
Northwestern pond turtle *Clemmys marmorata marmorata*	FC	CSC	
Southwestern pond turtle *Clemmys marmorata pallida*	FC	CSC	
Birds			
Harlequin duck *Histrionicus histrionicus*	FC	CSC	
Northern goshawk *Accipiter gentilis*	FC	CSC	
American Peregrine falcon *Falco peregrinus anatum*	FD	CE	
Flammulated owl *Otus flammeolus*	FC		
California spotted owl *Strix occidentalis occidentalis*	FC	CSC	
Vaux's swift *Chaetura vauxi*	FC	CSC	

[2] Status:
USFWS
FE = federally endangered
FT = federally threatened
FD = federally delisted (status to be monitored for at least five years)
FCL = federal candidate for listing
FC = federal species of concern
FLC = federal species of local concern
State
CE = California endangered
CT = California threatened
CSC = California species of special concern
R = California rare
Park
PS = Yosemite Park sensitive
PW = Yosemite Park watch list

Table III-4 (continued)
Rare, Threatened, and Endangered Species Considered in this Analysis

Species	Status[2]		
	USFWS	State	Park
Black swift *Cypseloides niger*	FC	CSC	
Rufous hummingbird *Selasphorus rufus*	FC		
White-headed woodpecker *Picoides albolarvatus*	FC		
Nuttall's woodpecker *Picoides nuttallii*	FLC		
American dipper *Cinclus mexicanus*	FLC		
Mammals			
Spotted bat *Euderma maculatum*	FC	CSC	
Small-footed myotis bat *Myotis ciliolabrum*	FC		
Long-eared myotis bat *Myotis evotis*	FC		
Fringed myotis bat *Myotis thysanodes*	FC		
Long-legged myotis bat *Myotis volans*	FC		
Yuma myotis bat *Myotis yumanensis*	FC	CSC	
Greater western mastiff bat *Eumops perotis californicus*	FC	CSC	
Marten *Martes americanus*	FC		
Vegetation			
Yosemite lewisia *Lewisia disepala*	FC		PS
Slender-stemmed monkeyflower *Mimulus filicaulis*	FC		PS
Yosemite popcorn-flower *Plagiobothrys torreyi* var. *torreyi*	FLC		PS
Bolander's clover *Trifolium bolanderi*	FC		PS
STATE LISTED RARE, THREATENED, OR ENDANGERED SPECIES AND SPECIES OF SPECIAL CONCERN			
Birds			
Cooper's hawk *Accipiter cooperi*		CSC	
Sharp-shinned hawk *Accipiter striatus*		CSC	
Prairie falcon *Falco mexicanus*		CSC	
Long-eared owl *Asio otus*		CSC	
Great gray owl *Strix nebulosa*		CE	
Little willow flycatcher *Empidonax traillii brewsteri*		CE	
Yellow warbler *Dendroica petechia*		CSC	

Table III-4 (continued)
Rare, Threatened, and Endangered Species Considered in this Analysis

Species	Status[2]		
	USFWS	State	Park
Mammals			
Pallid bat *Antrozous pallidus*		CSC	
Pale big-eared bat *Corynorhinus townsendii pallescens*		CSC	
Townsend's big-eared bat *Corynorhinus townsendii townsendii*		CSC	
Sierra Nevada red fox *Vulpes vulpes necator*		CT	
PARK SENSITIVE SPECIES			
Vegetation			
Sugar stick *Allotropa virgata*			PS
Slender silver-moss *Anomobryum julaceum*			PS
Repand rock cress *Arabis repanda* var. *repanda*			PS
Lemmon's wild ginger *Asarum lemmonii*			PS
Sierra bolandra *Bolandra californica*			PS
Hair-leaf sedge *Bulbostylis capillaries*			PS
Yosemite evening-primrose *Camissonia sierrae* ssp. *Sierrae*			PS
Shore sedge *Carex limosa*			PS
Single-spiked sedge *Carex scirpoidea* var. *pseudoscirpoidea*			PS
Whitney's sedge *Carex whitneyi*			PS
Fresno ceanothus *Ceanothus fresnensis*			
Bride's bonnet *Clintonia uniflora*			PS
Short-bracted bird's-beak *Cordylanthus rigidus* ssp. *Brevibracteatus*			PS
Mountain lady's slipper *Cypripedium montanum*			PS
Stream orchid *Epipactis gigantean*			PS
Slender cotton-grass *Eriophorum gracile*			PS
Fawn-lily *Erythronium purpurascens*			PS
Small-flowered fescue *Festuca minutiflora*			PS
Boreal bedstraw *Galium boreale* ssp. *Septentrionale*			PS

Table III-4 (continued)
Rare, Threatened, and Endangered Species Considered in this Analysis

Species	Status[2]		
	USFWS	State	Park
Goldenaster *Heterotheca sessiliflora* ssp. *Echioides*			PS
Yosemite ivesia *Ivesia unguiculata*			PS
Sierra laurel *Leucothoe davisiae*			PS
False pimpernel *Lindernia dubia* var. *anagallidea*			PS
Tanoak *Lithocarpus densiflorus* var. *echinoides*			PS
Inyo meadow lupine *Lupinus pratensis* var. *pratensis*			PS
Northern bugleweed *Lycopus uniflorus*			PS
Yosemite tarplant *Madia yosemitana*			PS
Bishop's cap *Mitella pentandra*			PS
Azure penstemon *Penstemon azureus* ssp. *Angustissimus*			PS
Phacelia *Phacelia tanacetifolia*			PS
Nuttall's pondweed *Potamogeton epihydrus* ssp. *Nuttallii*			PS
White beaked rush *Rhynchospora alba*			PS
Wood saxifrage *Saxifraga mertensiana*			PS
Clark's ragwort *Senecio clarkianus*			PS
Streambank butterweed *Senecio pseudaureus* var. *pseudaureus*			PS
Giant sequoia *Sequoiadendron giganteum*			PS
Small bur-reed *Sparganium natans*			PS
Ladies' tresses *Spiranthes porrifolia*			PS
Pacific starflower *Trientalis latifolia*			PS
Bowl clover *Trifolium cyathiferum*			PS
Lesser bladderwort *Utricularia minor*			PS
Hall's wyethia *Wyethia elata*			PS

Source: *Yosemite Valley Plan*, (NPS 2000a)

Further information on federally listed threatened or endangered species; federal species of concern; state-listed threatened, endangered, and rare species; state species of special concern; and species that are locally rare or threatened that are known to be or could be present within the Merced River corridor are listed in Appendix G of the *Revised Merced River Plan SEIS* (NPS 2005a) and in the *Merced Wild and Scenic River Comprehensive Management Plan Biological Assessment* (NPS 2000c), which are on file at Yosemite National Park. This information is based on data provided by the National Park Service, the U.S. Fish and Wildlife Service (USFWS 2004), and California Natural Diversity Database (CDFG 2004).

Critical Habitat: Critical habitat has not been designated for any federally listed species that is known or has the potential to occur within the project area.

Environmental Consequences – Methodology

Wildlife: The impact evaluation for special-status wildlife species was based on the following: (1) the known or likely occurrence of a species or its preferred habitat in the vicinity of the project area; (2) the direct physical loss or adverse modification of habitat; (3) the effective loss of habitat (through avoidance or abandonment) due to construction activity or noise, or the species' sensitivity to human disturbance.

Plants: The impact evaluation for special-status plant species was based on the following: (1) the known or likely occurrence of a species or its preferred habitat in the vicinity of the project area; (2) the direct physical loss of habitat; (3) the effective loss of habitat through loss of habitat features such as surface water flows. Impact evaluations determined the location of species in proximity to the proposed project disturbance and assessed the sensitivity of a species to impacts (considering rarity, resilience, population size, and distribution of species throughout the park).

Surveys specific to this planning effort to identify individuals or populations of special status species within the corridor have not been performed. Data presented herein are based on field reconnaissance, literature review, the professional knowledge and judgment of park staff, records of observations, published references, and studies of selected species.

Impacts to special status species were assessed in terms of duration, type, and intensity of impact, as discussed below. Unless otherwise noted, local impacts were considered to be those that occur in the immediate vicinity of an action or in a nearby area indirectly affected by the action.

Duration of Impact: The expected duration of impacts has been defined as long-term or short-term for special-status wildlife and plant species. Long-term impacts would be defined as those lasting 20 years or longer and short-term impacts as those lasting less than 20 years.

Intensity of Impact: The intensity and magnitude of impacts on special-status vegetation and wildlife species have been described as negligible, minor, moderate, or major. Negligible impacts would be imperceptible or not detectable. Minor impacts would be slightly detectable, localized within a relatively small area, and would not affect the overall viability of resources in the park; without further impacts, adverse effects would be reversed, and the resource would recover. Moderate impacts would be sufficient to cause a change in the resource (e.g., abundance, distribution, quantity, or quality), but would remain localized; they would be readily apparent. Major impacts would be substantial, highly noticeable, and affect larger areas.

Type of Impact: Impacts were classified as adverse if they would negatively affect population size, habitat size and continuity, or integrity of a special-status species. Conversely, impacts were classified as beneficial if they would positively affect population size or the size, continuity, or integrity of habitat.

Environmental Consequences of Alternative 1 (No Action)

Under Alternative 1, parking and roadside activities would continue to occur in an informal manner along portions of the Yosemite Valley Loop Road and poor and/or inadequate roadside drainage would continue to degrade habitat health and connectivity in localized areas. Impacts to special-status species as a result of Alternative 1 are expected to have a localized, long-term, negligible, adverse impact to special status species in Yosemite Valley.

Cumulative Impacts: Certain development projects in the Valley could result in increased disturbance to special status species, such as the expansion of campgrounds, construction of lodging and employee housing, and utility improvements in some areas as identified in the *Yosemite Valley Plan* (NPS 2000a). However, other *Yosemite Valley Plan* projects related to habitat restoration (such as removal of roads through Stoneman and Ahwahnee Meadows and the Visitor Use and Floodplain Restoration in East Yosemite Valley Project) and designed to restore wet meadow habitats in areas previously developed as campgrounds would have long-term, beneficial effects on habitat areas. Although these types of projects may have slight site-specific, short-term, adverse effects (e.g., potential construction activity disturbance of wildlife and habitat areas), the objective of these projects is to restore and manage natural resources and habitat areas. For example, full implementation of the *Yosemite Valley Plan* would restore approximately 177 acres of habitat. Overall, Alternative 1, in combination with the cumulative projects, would result in local, long-term, minor, beneficial cumulative impacts to sensitive species and their habitat areas.

Impairment: Impacts to special-status species as a result of Alternative 1 are expected to have a localized, long-term, negligible, adverse impact to special status species in Yosemite Valley. Therefore, Alternative 1 would not impair the park's special status species for future generations.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

The Yosemite Valley Loop Roadway and immediately adjacent areas have generally been disturbed through a variety of means including construction of roadside facilities and periodic maintenance of some roadside drainages, and routine culvert cleaning activities. As a result, impacts to special status species are not expected to occur in the vicinity of proposed construction activities. Implementation of Alternative 2 could contribute to the restoration of vegetation communities and habitat areas by enhancing natural surface and subsurface hydrologic processes through culvert improvements and the installation of a permeable subgrade beneath the road in sections prone to seasonal flooding. This proposed work is located in meadow, riparian, and California black oak communities along the roadway, areas which are considered among the most diverse vegetation classes in Yosemite Valley and have the greatest likelihood of supporting species diversity. Communities within and adjacent to wetland and meadow areas may be enhanced by improved hydrologic flow and connectivity. Impacts to special status species associated with these areas would be expected to be long-term, negligible to minor, and beneficial in nature.

Cumulative Impacts: Certain development projects in Yosemite Valley could result in increased disturbance to special status species, such as the expansion of campgrounds, construction of

lodging and employee housing, and utility improvements in some areas as identified in the *Yosemite Valley Plan* (NPS 2000a). However, other *Yosemite Valley Plan* projects related to habitat restoration (such as removal of roads through Stoneman and Ahwahnee Meadows and the Visitor Use and Floodplain Restoration in East Yosemite Valley Project) and designed to restore wet meadow habitats in areas previously developed as campgrounds would result in long-term, beneficial impacts to sensitive habitat areas. Although these types of projects may have slight site-specific, short-term, adverse effects (e.g., potential construction activity disturbance of special status species and habitat areas), the objective of these projects is to restore and manage natural resources and sensitive habitat areas. For example, full implementation of the *Yosemite Valley Plan* would restore approximately 177 acres of habitat. Overall, Alternative 2, in combination with the cumulative projects, would result in local, long-term, minor, beneficial cumulative impacts to special status species.

Impairment: Implementation of Alternative 2 would be expected to help protect and enhance high value habitat areas along the Yosemite Valley Loop Roadway through the formalization of roadside parking areas and the improvement of drainage facilities. Areas of potential resource encroachment would be minimized and natural hydrologic processes restored, resulting in long-term, minor, beneficial impacts to special status species. Therefore, Alternative 2 would not impair the park's special status species for use and enjoyment by future generations.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Implementation of Alternative 3 would be expected to result in the same impacts to special status species as described for Alternative 2, with the following exceptions:

- The proliferation of informal roadside parking areas would continue to occur under this alternative, potentially impacting plant and wildlife habitat in these areas.
- Hydrologic flow in habitat areas adjacent to the roadway, especially California black oak forests, would not be enhanced by the installation of a permeable subgrade beneath the roadway in areas prone to seasonal flooding.
- Construction activities would be of a shorter duration due to the reduction in improvements to roadside parking areas and hydrology as described above.

As a result, implementation of Alternative 3 would result in localized, long-term, negligible, beneficial impacts to special status species along the Yosemite Valley Loop Road.

Cumulative Impacts: Certain development projects in Yosemite Valley could result in increased disturbance to sensitive species, such as the expansion of campgrounds, construction of lodging and employee housing, and utility improvements in some areas as identified in the *Yosemite Valley Plan* (NPS 2000a). However, other *Yosemite Valley Plan* projects related to habitat restoration (such as removal of roads through Stoneman and Ahwahnee Meadows and the Visitor Use and Floodplain Restoration in East Yosemite Valley Project) and designed to restore wet meadow habitats in areas previously developed as campgrounds would result in long-term, beneficial impacts to habitat areas. Although these types of projects may result in slight site-specific, short-term, adverse impacts (e.g., potential construction activity disturbance of wildlife and habitat areas), the objective of these projects is to restore and manage natural resources and habitat areas. For example, full implementation of the *Yosemite Valley Plan* would restore approximately 177 acres of habitat. Overall, Alternative 3, in combination with the cumulative projects, would result in local, long-term, minor, beneficial cumulative impacts to sensitive species.

Impairment: Alternative 3 would help to protect and enhance high value habitat areas along the Yosemite Valley Loop Roadway through improvement of drainage facilities in valued vegetation communities. Areas of potential resource encroachment would be minimized and natural hydrologic processes restored, resulting in long-term, minor, beneficial impacts to sensitive species and their habitats. Therefore, Alternative 3 would not impair the park's special status species for the use and enjoyment by future generations.

Air Quality

Affected Environment

Yosemite National Park is classified as a mandatory Class I area under the Clean Air Act (42 USC 7401 et seq.). This air quality classification is aimed at protecting national parks and wilderness areas from air quality degradation. The Clean Air Act gives federal land managers the responsibility of protecting air quality and related values, including visibility, plants, animals, soils, water quality, cultural resources, and public health from adverse air pollution impacts. The U.S. Environmental Protection Agency has set national standards for six pollutants: ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, and particulate matter less than 10 microns (PM_{10}). In addition, California has set ambient air quality standards that are more strict than the national standards.

Yosemite Valley is in Mariposa County, which is regulated by the Mariposa County Air Pollution Control District. The Mariposa County Air Pollution Control District is responsible for developing a state implementation plan for federal and state nonattainment pollutants. State implementation plans define control measures designed to bring areas into attainment with federal and state air quality standards. Currently, Mariposa County is in attainment or is unclassified for all national ambient air quality standards; however, Mariposa County exceeds two California ambient standards: ozone (throughout the county) and PM_{10} (in Yosemite Valley).

Sensitive Receptors: Schools, child care centers, hospitals, and convalescent homes are considered to be more sensitive than the general public to poor air quality because the population groups associated with these land uses have an increased susceptibility to respiratory distress. Persons engaged in strenuous work or exercise also have increased sensitivity to poor air quality. Residential areas are considered more sensitive to air quality conditions than commercial and industrial areas because people generally spend longer periods of time at their residences. Recreational areas are also considered sensitive compared to commercial and industrial areas due to the greater exposure to ambient air associated with outdoor activities. Trail and recreational users in Yosemite Valley would be the closest sensitive receptors to activities associated with this project.

Environmental Consequences – Methodology

The air quality analysis was based on a qualitative analysis of air emissions from construction and removal activities as well as long-term operations of utility facilities. The creation of pollutants resulting from the implementation of an alternative can contribute to an impact on air quality; however, air quality is a regional issue that is influenced by factors outside the immediate area. In addition, many air quality issues are related to non-construction vehicles and air quality analysis often focuses on vehicle emissions related to increases or decreases in traffic volumes. Since this project is not expected to affect non-construction vehicle trips or traffic volumes, non-construction vehicular emissions are not addressed.

Air quality impacts were evaluated in terms of intensity and duration and whether the impacts were considered beneficial or adverse. Cumulative effects on air quality were also considered based on past, present, and reasonably foreseeable future actions occurring in Yosemite National Park, in combination with the potential air quality effects of each alternative.

Duration of Impact: The duration of the impact considered whether the impact would occur in the short term or long term. Generally, short-term impacts are temporary, transitional and associated with construction and removal activities. Long-term impacts are typically those effects that continue to occur after construction and last 10 years or more and could be considered permanent.

Intensity of Impact: The intensity of an impact considers whether the impact is judged negligible, minor, moderate, or major relative to air quality conditions associated with the No Action Alternative.

Type of Impact: Impacts were considered beneficial or adverse to air quality. Beneficial air quality impacts would reduce emissions or lower pollutant concentrations, while adverse impacts would increase emissions or raise pollutant concentrations.

Environmental Consequences of Alternative 1 (No Action)

Under Alternative 1, air quality would continue to be affected by routine maintenance activities with respect to the Yosemite Valley Loop Road, resulting in short term, negligible to minor, adverse affects to air quality.

Although pollutant emissions resulting from implementation of Alternative 1 could contribute to an impact on air quality in Yosemite Valley, air quality is a regional issue that is more influenced by regional factors. This section presents a qualitative assessment of air emissions related to continued use and routine maintenance of the Yosemite Valley Loop Roadway.

Alternative 1 would include periodic use of construction equipment to maintain the existing roadway and drainage facilities. Air quality effects from this alternative would relate primarily to construction equipment emissions and dust generated during planned repair activities. Emissions from construction equipment would occur in the immediate vicinity of the road corridor. Ongoing maintenance and repair activities are expected to be of relatively short duration, and many repairs would be timed during late fall or early spring when visitor levels in the park are at their lowest. Use of Best Management Practices (e.g., site watering, covering stockpiles, covering haul trucks, or vehicle emission controls) would be implemented to reduce both tailpipe and fugitive dust emissions. As a result, impact to local and regional air quality are expected to negligible, long-tern and adverse.

Cumulative Impacts: Since 1950, the population of California has tripled, and the rate of increase in vehicle-miles-traveled has increased six-fold. Air quality conditions within the park have been influenced by this surge in population growth and associated emissions from industrial, commercial, and vehicular sources in upwind areas. Since the 1970s, emissions sources operating within the park, as well as California as a whole, have been subject to local stationary-source controls and state and federal mobile-source controls. With the passage of time, such controls have been applied to an increasing number of sources, and the associated requirements have become dramatically more stringent and complex. In the 1980s, a Restricted Access Plan was developed for use when traffic and parking conditions in Yosemite Valley become congested. The

plan has the effect of reducing the number of incoming vehicles and their related emissions until the traffic volume and parking demand in Yosemite Valley decrease sufficiently (as visitors leave the Valley) to stabilize traffic conditions.

The Yosemite Area Regional Transportation System (YARTS) is a multi-agency effort to provide transportation options, reduce reliance on automobiles, and improve regional air quality. Efforts underway under this project are expected to result in long-term, beneficial impacts on air quality throughout the region.

The *Yosemite Valley Plan* proposes to enhance the quality of the visitor experience in Yosemite Valley by reducing automobile congestion and limiting crowding. It also proposes traffic management systems and options for the size and placement of parking lots, both within and outside of Yosemite Valley. Parking lot(s) outside the Valley could be used to intercept day visitors and shift those visitors to Valley-bound shuttle buses. The *Yosemite Valley Plan* would have a long-term, moderate, adverse impact on nitrogen oxide emissions from the use of diesel buses through 2015, but long-term, minor to major, beneficial impacts to volatile organic compounds, carbon monoxide, and particulate matter emissions.

The purpose of the *Revised Merced River Plan* is to protect and enhance the Outstandingly Remarkable Values and free-flowing condition of the river for the benefit and enjoyment of present and future generations. The protection of natural resources under this plan would benefit air quality.

Reasonably foreseeable future actions proposed for Yosemite Valley could have beneficial or adverse impacts on air quality. For example, the National Park Service's Shuttle Bus Replacement Project could have a net beneficial effect on air quality by improving the attractiveness of alternative modes of transportation and thereby reducing private automobile trips. Although the Shuttle Bus Replacement Project would have localized, short-term, adverse air quality effects, the general goal of the project is to relieve congestion and provide for alternative means of transportation. As such, this project would encourage travel to the park by alternative (nonprivate vehicle) modes and would have a long-term, beneficial effect on air quality.

Other reasonably foreseeable future National Park Service projects, such as the Eagle Creek/ Merced River Ecological Restoration Project and Trail Reconstruction from Happy Isles to Vernal Fall, are not anticipated to have a net adverse or beneficial effect on air quality except for short-term, localized impacts during construction.

Although cumulative growth in the region will tend to adversely affect air quality, implementation of ongoing state and federal mobile-source control programs would ameliorate this effect to a degree. With respect to particulate matter, conditions in the Valley would be determined by both regional sources and local sources and could be beneficial or adverse. Considered with the adverse impacts associated with regional air quality influences, the cumulative projects would have a local, long-term, moderate, beneficial impact on air quality in Yosemite Valley.

Alternative 1 and the cumulative projects would result in local, long-term, moderate, beneficial impacts on local and regional air quality. The local, short-term, adverse effects associated with construction emissions from maintenance activities on the Yosemite Valley Loop Road would not offset the long-term, beneficial effects of the cumulative projects.

Impairment: Implementation of Alternative 1 is expected to result in local, short-term, minor, adverse impacts to air quality from construction activities. These short-term impacts are not expected to impair park resources for future generations.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

Alternative 2 would include use of construction equipment to rehabilitate and replace existing drainage facilities and to repave the roadway. Air quality impacts as a result of this alternative would relate primarily to construction equipment emissions and dust generated during construction activities along the roadway and the potential short-term use of an asphalt batch plant. Emissions would occur in the immediate vicinity of construction activities and trucks moving into and out of the project area, as well as excavation activities along the road corridor, could generate increased levels of dust. Effects would be related to heavy equipment and human intrusion and could include dust generation, soil disturbance and compaction, vegetation removal, and trench excavation, all of which may contribute to an increase in suspended particulate matter. Construction activities in each area are expected to be of relatively short duration, and many repairs would be timed during the fall and winter when visitor levels are lowest. Use of Best Management Practices (e.g., site watering, covering stockpiles, covering haul trucks, and vehicle emission controls) to reduce both tailpipe and fugitive dust emissions would be made a condition of construction contractor agreements. Implementation of Alternative 2 could result in localized, short-term, negligible, adverse effects on overall air quality in Yosemite Valley.

Cumulative Impacts: Overall past, present and reasonably foreseeable cumulative actions in conjunction with the actions called for under Alternative 2 would be generally the same as those described for Alternative 1, resulting in local, long-term, moderate, beneficial impacts on local and regional air quality.

Impairment: Implementation of Alternative 2 is expected to result in local, short-term, negligible, adverse impacts to air quality from construction activities and regional, long-term, negligible adverse impacts to air quality from operations. These minor, short and long-term, negligible impacts are not expected to impair park resources for future generations.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Implementation of Alternative 3 would be expected to result in the same impacts to air quality as described for Alternative 2, with the following exception:

- Construction activities would be of a shorter duration due to the reduction in improvements to roadside parking areas and hydrology as described above.

As a result, implementation of Alternative 3 could affect air quality in the vicinity of construction activities resulting in short-term, negligible, adverse impacts to overall air quality in Yosemite Valley.

Cumulative Impacts: Overall past, present and reasonably foreseeable cumulative actions in conjunction with the actions called for under Alternative 2 would be generally the same as those described for Alternative 1, resulting in local, long-term, moderate, beneficial impacts to local and regional air quality.

Impairment: Implementation of Alternative 3 is expected to result in local, short-term, negligible, adverse impacts to air quality from construction activities and regional, long-term, negligible, adverse impacts to air quality from operations. These minor, short and long-term, negligible impacts are not expected to impair park resources for future generations.

Noise

Affected Environment

By definition, noise is human-caused sound and is considered to be unpleasant and unwanted. Whether a noise is considered unpleasant depends on the individual listening to the sound and what the individual is doing when the sound is heard (e.g., working, playing, resting, or sleeping). Natural sounds within Yosemite Valley are not considered to be noise. These sounds result from natural sources such as waterfalls, flowing water, wildlife, wind, and rustling tree leaves. The existing noise within the park results from mechanical sources such as motor vehicles, generators and aircraft, and from human activities, such as talking and yelling.

Sound and noise levels are measured in units known as decibels (dB). For the purpose of this analysis, sound and noise levels are expressed in decibels on the "A" weighted scale (dBA). This scale most closely approximates the response characteristics of the human ear to low-level sound. Human hearing ranges from the threshold of hearing (0 dBA) to the threshold of pain (140 dBA). Environmental sound or noise levels typically fluctuate over time, and different types of noise descriptors are used to account for this variability. One of these descriptors is the *day night noise level average*, which reflects the noise level averaged over a 24-hour period.

Current sound levels in Yosemite Valley vary by location and also by season (the volume of water in the waterfalls and rivers is lower in the fall and higher in the spring). Noise levels are also influenced by the number of visitors to the park and by the proximity of mechanical noise sources. Winter ambient noise levels at various locations in Yosemite Valley were measured in 1999 (NPS 2000a). Ambient noise levels ranged from 59 to 69 dBA day-night level. Summer ambient noise levels would be expected to be higher due to the level of visitation and activity during summer months.

Existing Noise Sources: Within the park, motor vehicle noise is most noticeable in Yosemite Valley, where there is a concentration of park visitors, vehicle traffic is heavy, and the topography places visitors in proximity to roads. However, the existing noise environment changes dramatically throughout the year directly in proportion to the level of use (i.e., the number of cars and buses that travel the various roadways in the park); therefore, noise levels are generally lower during the winter than during the busy summer months.

Noise from motor vehicles is loudest immediately adjacent to the roadways, but due to generally low background sound levels, can be audible a long distance from the roads. Atmospheric effects such as wind, temperature, humidity, topography, rain, fog, and snow can affect the presence or absence of motor vehicle noise. Logically, noise levels from motor vehicles will be loudest where and when activity levels are the greatest and nearest to the sources of noise.

Other Sources: Other mechanical sources of noise within Yosemite Valley include construction equipment, generators, radios, and park maintenance equipment. Noise from these sources varies by season and by distance from source. The table below (table III-5) provides noise estimates for typical construction equipment.

Environmental Consequences – Methodology

Impacts related to noise were assessed in terms of duration, type, and intensity of impact, as discussed below. Unless otherwise noted, local impacts were considered to be those that occur in the immediate vicinity of an action or in a nearby area indirectly affected by the action.

Duration of Impact: Short-term impacts would be temporary impacts that typically occur during construction activities. Long-term impacts would be impacts that continue to occur after construction and typically last 10 years or more and would be considered permanent changes.

Intensity of Impact: The level of impact (negligible, minor, moderate, or major) of sound changes from the No Action Alternative to the action alternatives was evaluated using the following definitions. A negligible impact indicates the change in sound levels would not be perceptible. A minor impact indicates the change in sound levels would be perceptible, but not likely to have a substantial annoyance effect on visitors or residents in the area. A moderate impact indicates the change in sound levels would be easily perceptible and likely to result in annoyance to some park visitors and residents. A major impact indicates the change in sound levels would be very perceptible and likely to annoy most park visitors and residents who experience it.

Type of Impact: Beneficial impacts are those impacts that result in less noise, and adverse impacts are those impacts that result in more noise.

Environmental Consequences of Alternative 1 (No Action)

Under Alternative 1, existing noise disturbance regimes would continue during routine use and maintenance of the Yosemite Valley Loop Road and associated drainage facilities. Periodic operation of heavy-duty equipment along the roadway could generate substantial amounts of noise during these operations. Noise in the area of maintenance operations would vary depending on a number of factors, such as the number and type of equipment in operation on a given day, usage rates, the level of background noise in the area, and the distance between sensitive areas and the construction site. Overall, Alternative 1 would be expected to result in local, short-term, negligible to minor, adverse impacts to park visitors, residents, and contractors in the vicinity of maintenance activities.

Cumulative Impacts: Cumulative effects to the ambient noise environment are based on the analysis of past, present, and reasonably foreseeable future actions in Yosemite Valley in combination with potential effects of this alternative. The projects identified below include those projects within Yosemite Valley that could affect noise within the Valley.

The *Yosemite Valley Plan* proposes to enhance the quality of the visitor experience in Yosemite Valley by reducing automobile congestion, limiting crowding, and expanding orientation and interpretation services. It also proposes traffic management systems and options for the size and placement of parking lots, both within and outside of Yosemite Valley. Parking lots outside the Valley could be used to intercept day visitors and shift those visitors to Valley-bound shuttle buses. Overall, general sound levels associated with traffic along most roadways in the Valley would be reduced, representing a long-term, beneficial impact.

The purpose of the *Revised Merced River Plan* is to protect and enhance the Outstandingly Remarkable Values and free-flowing condition of the river for the benefit and enjoyment of present and future generations. The protection of natural resources and maintenance of visitor-

intensive uses in the appropriate management zones under this plan would have beneficial effects on the noise environment.

Reasonably foreseeable future actions proposed for Yosemite Valley could have beneficial or adverse impacts on noise. For example, the National Park Service's Shuttle Bus Replacement Project could have a net beneficial effect on the ambient noise environment by improving the attractiveness of alternative modes of transportation, thereby reducing private automobile trips. Although the Shuttle Bus Replacement Project would increase the frequency of bus trips and related localized, short-term, adverse noise effects, noise levels generated by the individual buses will decrease. The general goal of the project is to relieve congestion and provide for alternative means of transportation. As such, this project would encourage travel to the park by alternative (nonprivate vehicle) modes and would have a long-term, beneficial effect on noise. To the extent that transportation-related projects would replace automobile trips in the Valley with bus trips, the anticipated beneficial effect would depend on ridership levels (and the corresponding number of automobile trips that would be avoided) and the technology selected for the buses.

Other reasonably foreseeable future National Park Service projects, such as Eagle Creek/ Merced River Ecological Restoration and Happy Isles to Vernal Fall Trail Reconstruction, are not anticipated to have a net adverse or beneficial effect on the ambient noise environment except for short-term, localized impacts during construction.

Impairment: The No Action Alternative would result in a local, short-term, negligible to minor, adverse effect on noise in Yosemite Valley during construction activities associated with routine maintenance to the Yosemite Valley Loop Road. Alternative 1 is not expected to result in long-term, adverse noise impacts and is not expected to impair park soundscapes for future generations.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

Alternative 2 would involve operation of heavy-duty construction equipment to pulverize and repave the roadway and to improve roadside drainages. Table III-5 provides typical noise levels generated by construction equipment that would likely be involved with construction activities. Construction noise levels would vary depending on a number of factors, such as the number and type of equipment in operation on a given day, usage rates, the level of background noise in the area, and the distance between sensitive receptors and the construction site.

Construction noise would be loudest immediately adjacent to the construction area, but due to generally low background sound levels in Yosemite Valley, the noise may be audible a long distance from the source. Some construction equipment and activities can produce sounds in excess of 100 dB, typically in short bursts over the duration of the project. These noises would be perceived as 16 or more times as loud as a typical vehicle. Overall, Alternative 2 would be expected to result in local, short-term, minor to moderate, adverse impacts to park visitors, residents, and contractors in the vicinity of maintenance activities. This alternative is not expected to have any long-term impact on ambient noise levels in Yosemite Valley.

Table III-5
Typical Noise Levels from Construction Equipment

Equipment	Typical Noise Level (dBA) 50 feet from the Source
Air Compressor	81
Backhoe	80
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85
Paver	89
Pneumatic Tool	85
Pump	76
Rock Drill	98
Roller	74
Saw	76
Scraper	89
Truck	88

dBA = A-weighted decibels

SOURCE: Federal Transit Authority 1995

Cumulative Impacts: Although Alternative 2 would resurface the road and improve roadside parking, drainage and natural hydrologic flow in the vicinity of culverts, Sentinel Creek drainage, and El Capitan Straight, overall past, present and reasonably foreseeable cumulative actions would be generally the same as those described for Alternative 1. These would represent a net long-term, negligible impact to noise in Yosemite Valley.

Impairment: Alternative 2 would result in local, short-term, minor to moderate, adverse noise impacts to park visitors and residents during construction activities. Alternative 2 is not expected to have any long-term, adverse effects on noise and is not expected to impair park soundscapes for future generations.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Implementation of Alternative 3 would be expected to result in the same noise-related impacts as described for Alternative 2, with the following exception:

- Construction activities would be of a shorter duration due to the reduction in improvements to roadside parking areas and hydrology as described above.

Overall, Alternative 3 would be expected to result in local, short-term, minor to moderate, adverse impacts to park visitors, residents, and contractors in the vicinity of maintenance activities. This alternative is not expected to have any long-term impact on ambient noise levels in Yosemite Valley.

Cumulative Impacts: Although Alternative 2 would resurface the road and improve roadside drainage and natural hydrologic flow in the vicinity of culverts, Sentinel Creek drainage, and El Capitan Straight, overall past, present and reasonably foreseeable cumulative actions would be generally the same as those described for Alternative 1. These would represent a net long-term, negligible impact to noise in Yosemite Valley.

Impairment: Alternative 3 would result in local, short-term, minor to moderate, adverse noise impacts to park visitors and residents during construction activities. Alternative 3 is not expected to have any long-term, adverse impacts to noise and is not expected to impair park soundscapes for future generations.

Cultural Resources

Yosemite Valley has been inhabited by people for thousands of years. Evidence of American Indian occupation dates to approximately 6000 years before present. Over the last 150 years, Euro-American influences have shaped the development of the Valley. These thousands of years of American Indian and Euro-American habitation of Yosemite National Park have left a rich material culture throughout Yosemite Valley. As a result, the project area contains numerous archeological resources, traditional cultural properties, and historic sites, structures, and landscapes, which are briefly described below.

Effects of each of the proposed alternatives on cultural resources are analyzed by resource type, in accordance with Section 106 of NHPA, the language and methodology of which differ slightly than that set forth in NEPA and found in other sections of this document.

Archeological Resources

Affected Environment

The entire Yosemite Valley is listed on the National Register of Historic Places as an archeological district of statewide significance, consisting of over a hundred known archeological sites. Individual archeological resources include historic debris scatters, historic structural remains, and prehistoric American Indian village sites and settlements. A more detailed description of archeological resources in Yosemite Valley has been presented in recent park planning documents such as the *Revised Merced River Plan SEIS* (NPS 2005a) and the East Yosemite Valley Utilities Improvement Plan Environmental Assessment (NPS 2003). Many Yosemite Valley roads and other facilities were originally constructed prior to the enactment of NEPA, NHPA, and ARPA, so many known sites, as well as potential unknown buried archeological resources, were impacted by the placement of the Yosemite Valley Loop Road. Between 35 and 40 known archeological sites are located within the Area of Potential Effect for this project.

Environmental Consequences – Methodology

Duration of Impact: Any change to the physical attributes of an archeological site is considered long-term and of permanent duration.

Intensity of Impact: Under NHPA, impacts to archeological sites are considered to have either an adverse effect or no adverse effect. No impact occurs when there are no archeological sites present, or the action will have no effect on archeological sites. When the impact of an action results in no alterations to the characteristics of an archeological site which qualify it for inclusion or eligibility to the National Register of Historic Places, the action is considered to have no adverse effect. When the impact of an action results in an alteration to the characteristics of an

archeological site which qualify it for inclusion or eligibility to the National Register of Historic Places, the action is considered to have an adverse effect under Section 106 of the NHPA. However, effects are not considered adverse under the 1999 Programmatic Agreement, which stipulates that archeological investigations guided by the *Yosemite Research Design and Archeological Synthesis* (Hull and Moratto 1999) are conducted to sufficiently minimize the effect. If the 1999 Programmatic Agreement cannot be implemented to avoid or minimize the effect, and the National Park Service, the California State Historic Preservation Officer and the Advisory Council on Historic Preservation cannot agree on measures to avoid or minimize adverse impacts and are unable to negotiate and execute an alternate memorandum of agreement in accordance with 36 CFR 800.6(b), the effect remains adverse.

Type of Impact: Adverse impacts to archeological resources include changes in visitor use patterns to increase access to sites, unauthorized artifact collection, vandalism, soil compaction, and ground disturbance within an archeological site area (such as earth-moving activities or increased erosion). Under NHPA, unlike under NEPA, beneficial impacts are not considered.

Environmental Consequences of Alternative 1 (No Action)

Alternative 1 would continue the routine maintenance and use of the existing Yosemite Valley Loop Road in Yosemite Valley, which would have the potential to impact several recorded archeological sites and may impact unrecorded buried cultural resources. Potential impacts are presented below:

- Routine road and culvert maintenance are not expected to have adverse effects on archeological resources, given that appropriate mitigation measures such as site avoidance, archeological monitoring, and protection of sensitive resources from increased foot traffic, are implemented where maintenance occurs on or adjacent to known archeological resources, and when previously unknown resources are inadvertently discovered.
- Continued expansion and use of unpaved turnouts and shoulders has some potential for adverse effects when it occurs on or adjacent to archeological resources, depending on the characteristics of the particular archeological site affected, due to automobiles and increased foot traffic.

Alternative 1 consists of continued routine road maintenance and repairs, which would be mitigated in accordance with stipulations outlined in the 1999 Programmatic Agreement to have no adverse effect on archeological sites.

Cumulative Impacts: Past development, operation and maintenance of facilities in the Valley has disturbed, destroyed or impacted the integrity of numerous archeological sites However, most sites still retain a high degree of integrity. General visitor traffic currently has minor adverse impacts on Valley archeological sites, mainly through soil compaction and unauthorized collection, and is expected to continue to do so in the future. Reasonably foreseeable future actions proposed in the region such as development and maintenance projects under the *Yosemite Valley Plan* (NPS 2000a), could have an adverse cumulative impact on archeological resources, but could be mitigated to have no adverse effect by implementing the 1999 Programmatic Agreement. Cumulatively, these projects, when combined with Alternative 1, are expected to have no adverse effect on archeological resources in Yosemite Valley.

Impairment: Potential adverse effects associated with Alternative 1 are expected to be mitigated through mitigation measures in accordance with the 1999 Programmatic Agreement. Therefore, this alternative would not impair the park's archeological resources for future generations.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

Actions proposed under Alternative 2 are expected to result in a range of impacts to archeological sites recorded within the Area of Potential Effect of the Yosemite Valley Loop Road Project. Impacts will be mitigated in accordance with the 1999 Programmatic Agreement to have no adverse effect. Actions with potential adverse effects to archeological sites that would require archeological mitigation measures prior to and during construction include: excavation below the current roadbed (e.g., for the utility duct bank); removal of roadway, shoulder, or turnout soil; and removal or placement of buried barrier stones. A more inclusive list of the impacts associated with Alternative 2 construction activities are listed below.

- Culvert rehabilitation, replacement, additions, and other improvements to roadside drainage, could result in adverse impacts when construction occurs on or adjacent to an archeological site, primarily where construction includes ground disturbance beyond previously disturbed ground. In addition, increased or redirected runoff from outlets of new or expanded culverts could adversely impact archeological resources by causing erosion and/or exposing or displacing artifacts. Depending on the extent of new ground disturbance proposed, mitigation measures from archeological monitoring to subsurface survey and testing would be implemented to limit the impacts to no adverse effect. Two proposed new and nine existing culverts proposed for improvements are located on seven archeological sites throughout the project area, and would require archeological work prior to construction. An additional five proposed new and 16 existing culverts proposed for improvements are adjacent to archeological sites, and may require archeological work, depending on the specific topography of the areas in which they are located.
- The installation of a utility duct bank beneath Southside Drive from Pohono Bridge to Wawona Road could potentially adversely impact three known prehistoric archeological sites, and would require subsurface survey and possibly further testing prior to construction in order to evaluate site significance and have a determination of no effect. Mitigation measures, including data recovery, may be required.
- The installation of a permeable subgrade beneath the roadway in the vicinities of Sentinel Creek drainage and El Capitan meadow would have no effect on known archeological resources, since they are being installed in an area with no known sites and limited potential for unknown sites. In accordance with the 1999 Programmatic Agreement, archeological monitoring may be required.
- Improvements such as standardizing the roadway width, resurfacing turnouts, and reinforcing roadway shoulders would result in no adverse effect to archeological resources when effects are mitigated in accordance with the 1999 Programmatic Agreement.
- Reducing or removing turnouts, removal and/or placement of boulders, and ditching or other soil displacement to delimit turnouts and roadway, could have potential adverse impacts when disturbing ground on sites, but these actions would be mitigated in accordance with the 1999 Programmatic Agreement to have no adverse effect.
- Curbing or the addition of barrier stones along the roadway and parking areas would help protect sites from disturbance from cars and foot traffic, so these actions would have no adverse effect.

Most actions proposed under Alternative 2 would result in no effects to archeological sites because they occur in areas of previously imported fill or in areas where there are no known archeological resources. The potential for adverse effects to archeological sites exists where construction activities require ground disturbance outside of the current road prism and road fill, but these actions would be mitigated in accordance with the 1999 Programmatic Agreement to

have no adverse effect. Overall, the implementation of Alternative 2 is expected to result in no adverse effect to archeological resources.

Cumulative Impacts: Past development, operation and maintenance of facilities in the Valley has disturbed, destroyed or impacted the integrity of numerous archeological sites, however, most sites still retain a high degree of integrity. General visitor traffic currently has minor adverse impacts on Valley archeological sites, mainly through soil compaction and unauthorized collection, and is expected to continue to do so in the future. Reasonably foreseeable future actions proposed in the region such as development and maintenance projects under the *Yosemite Valley Plan* (NPS 2000a), could have an adverse cumulative impact on archeological resources, but would be mitigated to have no adverse effect. Cumulatively, these projects and Alternative 2 are expected to have no adverse effect on archeological resources in Yosemite Valley.

Impairment: Potential adverse effects associated with Alternative 2 are expected to be mitigated through mitigation measures in accordance with the 1999 Programmatic Agreement. Therefore, this alternative would not impair the park's archeological resources for future generations.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Implementation of Alternative 3 would be expected to result in similar impacts described for Alternative 2, with the following exceptions:

- Informal roadside parking areas would be replaced in-kind, which would result in no effects to archeological resources on or adjacent to these areas, aside from the potential adverse impact of not restricting vehicular and foot traffic.
- A permeable subgrade beneath the roadway would not be installed in the vicinities of Sentinel Creek drainage and El Capitan meadow, resulting in no effects to archeological resources that may be beneath the roadway in these areas.
- Some ground disturbing activities such as the placement of new barrier stones, or reduction of turnout areas, would not take place, resulting in no effects to archeological resources in these areas.

Most actions proposed under Alternative 3 would result in no effects to archeological sites because they occur in areas of previously imported fill or in areas where there are no known archeological resources. The potential for adverse effects to archeological sites exists where construction activities require ground disturbance outside of the current road prism and road fill, but these actions would be mitigated in accordance with the 1999 Programmatic Agreement to have no adverse effect. Overall, the implementation of Alternative 3 is expected to result in no adverse effect to archeological resources.

Cumulative Impacts: Past development, operation and maintenance of facilities in the Valley has disturbed, destroyed or impacted the integrity of numerous archeological sites, however, most sites still retain a high degree of integrity. General visitor traffic currently has minor adverse impacts on Valley archeological sites, mainly through soil compaction and unauthorized collection, and is expected to continue to do so in the future. Reasonably foreseeable future actions proposed in the region such as development and maintenance projects under the *Yosemite Valley Plan* (NPS 2000a), could have an adverse cumulative impact on archeological resources, but would be mitigated to have no adverse effect. Cumulatively, these projects and Alternative 2 are expected to have no adverse effect on archeological resources in Yosemite Valley.

Impairment: Potential adverse effects associated with Alternative 3 are expected to be mitigated through mitigation measures in accordance with the 1999 Programmatic Agreement. Therefore, this alternative would not impair the park's archeological resources for future generations.

Traditional Cultural Properties

Affected Environment

Traditional cultural properties are any "…site, structure, object, landscape, or natural resources feature assigned traditional, legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (NPS 1991). Traditional cultural properties are traditional cultural resources that are eligible for or listed on the National Register of Historic Places as historic properties.

American Indian people continue their traditional cultural associations with Yosemite National Park and its resources. The National Park Service consults with American Indian people about management of parklands, especially regarding the nature of the undertakings and potential impacts to park resources. Some of the primary concerns are access to park areas for traditional cultural practices, management of resources, and protection of archeological sites and other sites to which American Indians attach religious and cultural significance. The project area encompasses 16 historic village sites and 28 recorded traditional gathering areas.

A traditional cultural study of Yosemite Valley identified and documented many cultural and natural resources associated with some of the American Indian occupation and use of Yosemite Valley (Bibby 1994). Proposed actions could affect the following properties that are associated with cultural practices or beliefs of associated American Indian people:

- Areas of past and present resource materials and food processing[3]
- Sites of traditional and contemporary spiritual value
- Places that figure into oral traditions
- Areas of historic habitation of humans
- Marked and unmarked graves

Environmental Consequences – Methodology

Duration of Impact: Any impacts to traditional cultural properties are considered long-term and of permanent duration.

Intensity of Impact: Under NHPA, impacts to traditional cultural properties are considered to have either an adverse effect or no adverse effect. No impact occurs when there are no traditional cultural properties present, or the action will have no effect on traditional cultural properties. When the impact of an action results in no alterations to the characteristics of a traditional cultural property which qualify it for inclusion or eligibility to the National Register of Historic Places, the action is considered to have no adverse effect. When the impact of an action results in an alteration to the characteristics of a traditional cultural property which qualify it for inclusion or eligibility to the National Register of Historic Places, the action is considered to have an adverse effect.

[3] Resources may include bedrock mortars and plant materials such as California black oak trees, grasses, mosses, sedges and mushrooms.

Type of Impact: Adverse impacts occur when physical changes to a traditionally used resource or its setting degrade the resource itself, or degrade access to or use of the resource. Under NHPA, unlike under NEPA, beneficial impacts are not considered.

Environmental Consequences of Alternative 1 (No Action)

Alternative 1 would continue the maintenance and use of the existing Yosemite Valley Loop Road, including those stretches that pass through traditional cultural areas. Implementing Alternative 1 would continue the restriction of natural hydrologic flow beneath the road due to collapsed, poorly maintained and/or improperly sized or placed culverts resulting in the continued deterioration of adjacent meadows, wetlands and other sensitive habitats that may contain resources that American Indian people consider culturally valuable. Proliferation of informal roadside parking, resulting in a steadily increasing number and size of roadside turnouts which could damage sensitive natural and cultural resources in many areas directly adjacent to the Yosemite Valley Loop Road, would adversely impact traditional cultural properties. The continued management of turnouts adjacent to areas of known sacred significance to American Indian peoples would result in both access to and impacts to these sites. However, the impacts associated with Alternative 1 are not expected to be severe enough to alter the characteristics of the traditional cultural properties which qualify them for the National Register of Historic Places. As a result, Alternative 1 would have no adverse effect.

Cumulative Impacts: Past development, operation and maintenance of facilities in Yosemite Valley has disturbed, destroyed or impacted the integrity of numerous traditional cultural properties. However, Yosemite National Park has also retained many sites and resources of significance to culturally associated American Indian people. Reasonably foreseeable future actions proposed in the region such as development and maintenance projects under the *Yosemite Valley Plan* (NPS 2000a), could have an adverse cumulative impact on traditional cultural properties. Future projects such as the Fern Spring Restoration Project and the Visitor Use and Floodplain Restoration Project, call for restoration of native vegetation could have a long-term beneficial effect on traditional cultural properties. Cumulatively, these projects and Alternative 1 would have no adverse effect on traditional cultural properties in Yosemite Valley.

Impairment: Alternative 1 is relatively limited in scope and would not change the current management or treatment of traditional cultural properties in Yosemite Valley. This alternative is not expected to result in impairment of the traditional cultural properties present in the park.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

The entire Yosemite Valley Loop Road corridor proposed for project construction has been previously disturbed by transportation facilities and other development activities. As such, impacts to traditional cultural properties under Alternative 2 would be relatively minor and limited to the area of the existing road prism, resulting in no adverse effects. Implementation of Alternative 2 would impact traditional cultural properties as described below:

- Improvement to natural hydrologic flow beneath the road due to the addition of culverts and a permeable subgrade, and rehabilitation or replacement of collapsed, poorly maintained and/or improperly sized or placed culverts would result in the improved health of adjacent meadows, wetlands and other sensitive habitats that may contain resources that American Indian people consider culturally valuable. These hydrologic improvements would have no adverse effect on traditional cultural properties.

- Placement of roadside barrier stones and formalization of roadside parking areas would help to protect traditional cultural properties adjacent to the roadway that are potentially encroached upon by visitor use. The continued management of turnouts adjacent to areas of known sacred significance results in both access to and impact to these sites. Overall, this action would have no adverse effect.

- Removal of turnouts adjacent to traditional use areas could restrict access of Native peoples to these resources. These actions would not change the character of the traditional cultural resource, therefore would be considered to have no adverse effect under NHPA. However, AIRFA requires that special attention must be paid to impacts on Native American religious practices that may result from Federal Agency actions, including access to these sites.

- Construction activities such as ditch-pulling, utility duct installment and culvert installation may take place in areas outside of the current road prism and road fill. Some of these areas would be expected to result in adverse impacts on traditional cultural properties, but these impacts are not expected to alter the characteristics of the traditional cultural properties which qualify them for the National Register of Historic Places, and therefore would have no adverse effect.

The proposed improvements to the Yosemite Valley Loop Road and drainage facilities included in Alternative 2 are expected to have long-term, beneficial impacts on areas containing traditional cultural properties through the restoration of more natural hydrologic processes. Although construction activities are expected to result in localized, short-term, minor, adverse impacts on traditional cultural properties, the overall impacts to traditional cultural properties under Alternative 2 are expected to have no adverse effect.

Cumulative Impacts: Past development, operation and maintenance of facilities in the Valley has disturbed, destroyed or impacted the integrity of numerous traditional cultural properties, however, Yosemite National Park has also retained many sites and resources of significance to culturally associated American Indian people. Reasonably foreseeable future actions proposed in the region such as development and maintenance projects under the *Yosemite Valley Plan* (NPS 2000a), could have an adverse cumulative impact on traditional cultural properties. Future projects such as the Fern Spring Restoration Project and the Visitor Use and Floodplain Restoration in East Yosemite Valley Project call for restoration of native vegetation and could have a long-term, beneficial impact on traditional cultural properties. Cumulatively, these projects and Alternative 2 would be expected to have no adverse effect on traditional cultural properties.

Impairment: Potential adverse effects associated with Alternative 2 are expected to be resolved through mitigation measures developed in consultation with the culturally associated tribes in accordance with the 1999 Programmatic Agreement. Alternative 2 would not impair park resources for future generations.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Implementation of Alternative 3 would impact traditional cultural properties to the same extent as described for Alternative 2 above, with the following exceptions:

- Roadside parking areas would remain unchanged, so the impacts of roadside parking would be similar to those under Alternative 1, causing no adverse effect overall.

- Hydrologic flow in some areas adjacent to the Yosemite Valley Loop Road would not be enhanced by the installation of a permeable subgrade, thus impacting the health of adjacent meadows, wetlands and other sensitive habitats that may contain resources that American Indian people consider culturally valuable.

Implementation of Alternative 3 would result in no adverse effect to traditional cultural properties along the Yosemite Valley Loop Road.

Cumulative Impacts: Past development, operation and maintenance of facilities in the Valley has disturbed, destroyed or impacted the integrity of numerous traditional cultural properties, however, Yosemite National Park has also retained many sites and resources of significance to culturally associated American Indian people. Reasonably foreseeable future actions proposed in the region such as development and maintenance projects under the *Yosemite Valley Plan* (NPS 2000a), could have an adverse cumulative impact on traditional cultural properties. Future projects such as the Fern Spring Restoration Project and the Visitor Use and Floodplain Restoration in East Yosemite Valley Project call for restoration of native vegetation and could have a long-term, beneficial impact on traditional cultural properties. Cumulatively, these projects and Alternative 3 would be expected to have no adverse effect on traditional cultural properties.

Impairment: Potential adverse effects associated with Alternative 3 are expected to be mitigated through mitigation measures developed in consultation with the culturally associated tribes in accordance with the 1999 Programmatic Agreement. Alternative 3 would not impair park resources for future generations.

Cultural Landscapes

Affected Environment

Cultural landscapes are the result of the long interaction between people and the land, and the influence of human beliefs and actions over time upon the natural landscape. Shaped through time by historical land use and management practices, as well as politics, property laws, technology, and economic conditions, cultural landscapes provide a living record of an area's past, a visual chronicle of its history. The dynamic nature of modern human life contributes to the continual reshaping of cultural landscapes, making them a good source of information about specific times and places, but at the same time rendering their long-term preservation a challenge.

The cultural processes of defining sacred space, of turning land into landscape, and of making a wild place into a public park have made Yosemite Valley one of the most culturally significant natural places in America. Thus, the significance of the Yosemite Valley cultural landscape cannot be described or assessed apart from its significance as a natural landscape. Landscapes depend on unity for their emotional effect, and at Yosemite this unity combines the pastoral and the awesome, the natural and the cultural, the past and the present. The Valley's cultural landscape encompasses cliff walls, meadows, the river and streams, as well as roads, trails, and buildings.

A determination of eligibility for the National Register of Historic Places has been prepared for the Yosemite Valley Historic District, which encompasses the entire Yosemite Valley Loop Road Project area. This determination of eligibility recognizes both a prehistoric and a historic period of significance for Yosemite Valley as a cultural landscape. The historic period of significance extends from 1851 to 1945 (NPS 1994c). The boundaries for the historic district extend from Pohono Bridge to Mirror Lake and Happy Isles and include a number of historic trails. The

determination of eligibility provides an in-depth analysis of Yosemite Valley as a single entity, describes the Valley's cultural significance and characteristics, and lists both prehistoric and historic resources that contribute to the landscape's significance.

Many historic sites within Yosemite Valley have been singled out for their significance and are listed in the National Register of Historic Places. Some of these are located within or partially within the Yosemite Valley Loop Road Project area, including:

- Fern Spring Historic Site, located on Southside Drive near Pohono Bridge
- Camp 4, located on Northside Drive, listed on the National Register of Historic Places
- Curry Village Historic District
- Yosemite Village Historic District

Several historic buildings located in Yosemite Valley are listed on the National Register, including three National Historic Landmarks. However, none of these buildings fall within the area of potential effect of this project. Many historic structures such as trails, roads, bridges, culverts and turnouts, however, are located within the area of potential effect. These include the existing Northside and Southside Drive alignments, the Yosemite Valley Loop Trail, Stoneman Bridge, and Pohono Bridge. In addition, some historic turnouts, historic culverts, and historic rockwork along the roadway are contributing elements to the Yosemite Valley Historic District.

In the summer of 2005, the National Park Service conducted an inventory of turnouts and culverts along the Yosemite Valley Loop Road in order to determine which were contributing features to the cultural landscape of the Yosemite Valley Historic District. Research indicated that original turnouts along the Yosemite Valley Loop Road were designed in the 1920's and 1930's, a considerably different era and culture than that of today. Often, designers sought to provide visitors with both audible and visual opportunities to take advantage of the sounds of water while auto-touring in open-top vehicles (Brown et al. 2005). It is unclear where, or how many original turnouts were constructed along the Yosemite Valley Loop Road. However, the 2005 NPS survey cites that there were eleven turnouts in 1963. Additional research will be conducted into 2006 to determine if any Yosemite Valley Loop Road turnouts would be eligible to be determined contributing features to the Yosemite Valley Historic District.

The 2005 NPS survey evaluated the inlets and outlets of 124 culverts along the Yosemite Valley Loop Road to determine eligibility as contributing features. Figure III-7 presents existing culverts along the Yosemite Valley Loop Road. Existing culverts that are considered to be contributing features are distinguished in the figure. Fifty-five existing culverts have been determined to contain at least one headwall that is considered a contributing feature, for a total of 71 eligible culvert headwalls.

Placeholder for Figure III-7. (Contributing and non-contributing culverts). Click here to open.

Back of figure placeholder

Environmental Consequences – Methodology

Duration of Impact: Any change to the physical attributes of a cultural landscape feature is considered long-term and of permanent duration.

Intensity of Impact: Under NHPA, impacts to cultural landscapes are considered to have either an adverse effect or no adverse effect. No impact occurs when there are no historic cultural landscapes present, or the action will have no effect on historic cultural landscapes. When the impact of an action results in no alterations to the characteristics of a historic cultural landscape which qualify it for inclusion or eligibility to the National Register of Historic Places, the action is considered to have no adverse effect. When the impact of an action results in an alteration to the characteristics of a historic cultural landscape which qualify it for inclusion or eligibility to the National Register of Historic Places, the action is considered to have an adverse effect. However, effects to features and/or patterns of a cultural landscape are not considered adverse if standard mitigation measures identified in the 1999 Programmatic Agreement are implemented in consultation with the California State Historic Preservation Officer, and if data recovery and reconstruction is carried out in accordance with *A Sense of Place: Design Guidelines for Yosemite Valley* (NPS 2005c). If the National Park Service, the California State Historic Preservation Officer and the Advisory Council on Historic Preservation cannot agree on implementation of standard mitigation measures to avoid or minimize adverse impacts and are unable to negotiate alternative measures in accordance with 36 CFR 800.6(b), the effect remains adverse.

Type of Impact: Adverse impacts to cultural landscape resources occur when irreparable alteration of features or patterns diminish the overall integrity of the landscape. Under NHPA, unlike under NEPA, beneficial impacts are not considered.

Environmental Consequences of Alternative 1 (No Action)

Alternative 1 would continue the maintenance and use of the existing Yosemite Valley Loop Road in Yosemite Valley, including those stretches that include cultural landscape resources. Impacts to cultural landscape resources could occur as a result of routine maintenance and repair of the road and associated drainage facilities, which would be mitigated in accordance with the 1999 Programmatic Agreement to have no adverse effect. Continued encroachment of vegetation on historic culverts and headwalls would have an adverse effect on historic structures. This is particularly apparent along Bridalveil Straight, where exposed tree roots are deteriorating the integrity of large box culvert channel outlet, and brushy vegetation is encroaching on the historic retaining wall. Long-term use, flooding events, and regular park operations have contributed to the deterioration of some historic headwalls that regular maintenance may not address. For example, if a dry laid stone lintel of a historic culvert headwall collapsed during a high water event, routine maintenance may not replace the lintel to its proper location unless it was considered a safety hazard or was impairing the proper function of the roadway or culvert.

Under Alternative 1, while continued routine road maintenance and repairs would be mitigated in accordance with the 1999 Programmatic Agreement to have no adverse effects, natural deterioration would have an eventual adverse effect on historic features if left unchecked. Overall, Alternative 1 is expected to have an adverse effect on the Yosemite Valley cultural landscape.

Cumulative Impacts: Past development, visitor use, and natural events have resulted in adverse cumulative impacts to historic resources and the cultural landscape. Over time, structures and sites such as homestead cabins, barns, road and trail segments, bridges, mining complexes,

railroad and logging facilities, historic tourist facilities, blazes, and campsites have been affected. These resources are reminders of the Valley's ranching, grazing, lumbering, and mining history as well as early tourism.

Reasonably foreseeable future actions that could affect historic and cultural landscape resources in the Valley include several proposals within the *Yosemite Valley Plan* (NPS 2000a). The *Yosemite Valley Plan* would result in the removal, relocation, or modification of historic buildings and structures, and the introduction of modern facilities and development within historic districts and contributing portions of the cultural landscape. The *Yosemite Valley Plan* also would restore native vegetation communities to patterns more in keeping with the cultural landscape and historic setting of the Valley. Overall, implementation of the *Yosemite Valley Plan* may adversely impact the cultural landscape. Protection of cultural resources is an integral component of the *Revised Merced River Plan*. The plan provides a framework for decision-making on future management actions within the Merced River corridor through the application of a consistent set of decision-making criteria and consideration of specific management elements. The plan would have no adverse effect on cultural resources, including historic structures and cultural landscape resources.

The impacts of cumulative projects in Yosemite Valley would be mitigated to have no adverse effect on the cultural landscape. Alternative 1 and the cumulative projects in Yosemite Valley would therefore be expected to have a similar adverse impact on historic and cultural landscape resources as Alternative 1 alone.

Impairment: Alternative 1 would have an adverse effect on the Yosemite Valley cultural landscape, however it is not expected to impair park resources for future generations.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

Actions proposed under Alternative 2 are expected to result in a range of impacts to cultural landscape resources within the Yosemite Valley Loop Road Project area. Proposed actions would most likely affect historic culvert headwalls, particularly in areas where improvements to roadside drainages are needed. Actions with potential adverse effects to historic features that would require mitigation prior to and during construction include: installation of drop inlets, expanding the size or realigning the placement of historic headwalls to accommodate expanded pipe size or culvert realignment, and improvements to accessibility on historic bridges. The proposed installation of a large box culvert on Southside Drive in the Bridalveil Falls area would also adversely impact a historic wall located on the south side of the road, as the installation of the culvert would require removal of a small section of the wall. Sections of the historic Valley Loop Trail will also be rehabilitated. All actions associated with Alternative 2 would be carried out in accordance with the guidelines set forth in *Yosemite Valley Loop Road: Historic Character, Culverts and Pullouts, Yosemite National Park* (Brown et al. 2005), the 1999 Programmatic Agreement, and *A Sense of Place: Design Guidelines for Yosemite Valley* (NPS 2005c), and therefore would have no adverse effect on the Yosemite Valley cultural landscape.

Cumulative Impacts: Cumulative effects of actions on historic structures and cultural landscape resources were described under Alternative 1. Alternative 2 is not expected to substantially change the effect of cumulative projects, which are expected to result in no adverse effect on these resources.

Impairment: Alternative 2 would have no adverse effects on cultural landscapes and would not impair park resources for future generations.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Implementation of Alternative 3 would impact cultural landscape resources to the same extent as described for Alternative 2 above, with the exception that improvements to the Valley Loop Trail would not take place. Overall, construction activities associated with Alternative 3 could result in impacts to historic culvert headwalls, Stoneman Bridge and Pohono Bridge. Similar to Alternative 2, these actions would be carried out in accordance with the guidelines set forth in *Yosemite Valley Loop Road: Historic Character, Culverts and Pullouts, Yosemite National Park* (Brown et al. 2005), the 1999 Programmatic Agreement, and *A Sense of Place: Design Guidelines for Yosemite Valley* (NPS 2005c), and therefore would have no adverse effect on the Yosemite Valley cultural landscape.

Cumulative Impacts: Cumulative effects of actions on historic structures and cultural landscape resources were described under Alternative 1. Alternative 3 is not expected to substantially change the effect of cumulative projects, which are expected to result in no adverse effect on these resources.

Impairment: Alternative 3 would no adverse effect on cultural landscapes and would not impair park resources for future generations.

Social Resources

The analysis of social resources examines effects on the social environment. Stewardship of Yosemite National Park requires consideration of two integrated purposes: to preserve Yosemite's unique natural and cultural resources and scenic beauty, and to make these resources available to visitors for study, enjoyment, and recreation. Social resources include scenic resources, visitor experience and recreation, and park operations.

Scenic Resources

Affected Environment

Yosemite National Park's scenic resources are a major component of the visitor's experience, and conserving the scenery is a crucial component of the National Park Service 1916 Organic Act and the park's enabling legislation. The park was established primarily for its natural and scenic features. The Merced River, El Capitan, Half Dome, and the Valley's magnificent waterfalls are some of the resources that contribute to the highly valued visual quality of the park.

The YNP *General Management Plan* (NPS 1980) identifies 11 significant scenic features, all of which are visible from Yosemite Valley: Half Dome, Yosemite Falls, El Capitan, Bridalveil Fall, Three Brothers, Cathedral Rocks and Spires, Sentinel Rock, Glacier Point, North Dome, Washington Column, and Royal Arches. The YNP *General Management Plan* (NPS 1980) also documented a scenic analysis of Yosemite Valley that evaluated all points from which these 11 features were typically viewed (assuming that no vegetation or structures obstructed the view) and the scenic viewing possibilities from different locations on the Valley floor. Existing viewpoints were identified, and the quality of views and proximity to roads and trails were noted. Views from the various locations in the Valley were classified according to the criteria shown in table III-6.

Table III-6
Classification Criteria for Scenic Category

Category	Criteria
A–Scenic	▪ Most commonly chosen by eminent early photographers and painters ▪ Currently considered most significant scenic views ▪ Includes all meadows and the Merced River
B–Scenic	▪ Less commonly chosen by historic photographers and painters ▪ Compose less significant modern views
C–Scenic	▪ Currently considered of minor scenic quality ▪ Areas that can accept visual intrusion without detracting from primary or secondary views

Source: Yosemite National Park's *General Management Plan,* (NPS 1980)

Environmental Consequences – Methodology

Impacts on scenic resources were examined and determined by:

- Comparing the existing visual character of the landscape in terms of the color, contextual scale, and formal attributes of landscape components and features, and the degree to which actions that may result from the proposed action would affect (i.e., contrast or conform with) that character

- Analyzing changes in experiential factors, such as whether a given action would result in a visible change, the duration of any change in the visual character, the distance and viewing conditions under which the change would be visible, and the number of viewers that would be affected

Scenic resources impacts consist of substantial changes that would alter: (1) existing landscape character, whether foreground, intermediate ground, or background, and would be visible from viewpoints the National Park Service has established as important; (2) access to historically important viewpoints or sequence of viewpoints; or (3) the visibility of a viewpoint or sequence of viewpoints.

Duration of Impact: The duration of scenic resources impacts is characterized as short-term or long-term. A short-term impact would be temporary (less than two years) due to construction, restoration, or demolition activities, and a long-term impact would be permanent and continual.

Intensity of Impact: The magnitude of impacts to the scenery within the view from specific vantage points and to specific scenic features is described as negligible, minor, moderate, or major as described below.

- Negligible impacts would be imperceptible or not detectable.
- Minor impacts would be slightly detectable or localized within a relatively small area.
- Moderate impacts would be those that are readily apparent.
- Major impacts would be substantial, highly noticeable, and/or result in changing the character of the landscape.

Type of Impact: Impacts were evaluated in terms of whether they would be beneficial or adverse to scenic resources. Beneficial impacts would enhance the existing landscape character, access to historically important viewpoints or sequence of viewpoints, or the visibility of a viewpoint or sequence of viewpoints. Adverse impacts would be effects that reduce the existing landscape

character, access to historically important viewpoints or sequence of viewpoints, or the visibility of a viewpoint or sequence of viewpoints.

Environmental Consequences of Alternative 1 (No Action)

Under Alternative 1, the existing Yosemite Valley Loop Road would be maintained and operated. Since the Merced River and adjacent meadows are included in the A scenic category, and most of the east Valley area is within the A or B scenic categories, any routine construction activities are likely to have short-term, adverse effects on scenic resources. The No Action Alternative is not expected to impact landscape character, access to important viewpoints, or visibility of viewpoints. Repair activities could have localized, short-term, minor, adverse impacts on scenic Valley views from various vantage points. Although views of scenic features would not be obstructed, there is a potential for the visual intrusion of construction activities into the view or the potential of short-term limited access to viewpoints. Alternative 1 would result in short-term, localized, minor, adverse affects due to routine construction activities. No long-term adverse effects on scenic resources are expected to occur as a result of implementing Alternative 1.

Cumulative Impacts: Alternative 1 and the cumulative projects within and in the Merced River corridor would result in a local, long-term, moderate, beneficial impact on scenic resources in Yosemite Valley. This is due to the overall emphasis on restoring disturbed or developed land to natural conditions within A category scenic areas and improving the health of ecosystems within Yosemite Valley. The long-term, beneficial effects on highly valued scenic resources associated with the restoration projects proposed in the *Yosemite Valley Plan* (NPS 2000a) would outweigh the localized, short-term, adverse effects associated with continued maintenance activities associated with Alternative 1.

Impairment: The No Action Alternative would result in short-term, minor to moderate, adverse impacts to scenic resources within Yosemite Valley. No long-term impacts to scenic resources are anticipated, and the park's highly valued scenic resources would not be impaired for future generations.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

Implementing Alternative 2 would be expected to result in both beneficial and adverse impacts to scenic resources. Adverse impacts would be considered localized and short-term, primarily resulting from construction activities. These impacts to scenic Valley views from various vantage points along the Yosemite Valley Loop Road would be considered minor to moderate in intensity. Although views of scenic features would not be obstructed, there is potential for the visual intrusion due to the following activities:

- Temporary construction activities along the roadway such as the temporary placement of signage, fencing, and the presence of construction equipment
- Brush clearing and roadway edge scarring, depleting from the foreground view, potentially affecting category A, B, and C scenic vistas in various areas in Yosemite Valley, and resulting in moderate, long term, adverse impacts to roadside scenic resources
- New rockwork at culverts and headwalls which could contrast from adjacent "aged" stonework

Overall, minor, long-term, beneficial impacts would be expected due to improved hydrologic flow, resulting in more scenic vegetation landscapes at select vista points. Improved accessibility to key turnouts and parking areas adjacent to viewpoints would also contribute to long-term, minor, beneficial impacts to scenic resources.

Cumulative Impacts: Alternative 2 and the cumulative projects within and adjacent to the Merced River corridor would result in a local, long-term, moderate, beneficial impact on scenic resources in Yosemite Valley. This is due to the overall emphasis on restoring disturbed or developed land to natural conditions within A category scenic areas and improving the health of ecosystems within Yosemite Valley. The long-term, beneficial effects on highly valued scenic resources associated with the restoration projects proposed in the *Yosemite Valley Plan* (NPS 2000a) would outweigh any short-term, adverse effects associated with construction activities associated with Alternative 2.

Impairment: Alternative 2 would result in long-term, negligible to minor, beneficial impacts to scenic resources within Yosemite Valley. No long-term adverse impacts to scenic resources are anticipated, and the park's highly valued scenic resources would not be impaired for future generations.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Implementation of Alternative 3 would impact scenic resources to the same extent as described for Alternative 2 above, with the following exceptions:

- The proliferation of informal roadside parking areas would continue to occur under this alternative, potentially impacting access to scenic vistas in these areas.
- Hydrologic flow in meadows and wetland areas adjacent to the Yosemite Valley Loop Road would not be enhanced by the installation of a permeable subgrade, thus, impacting the health of adjacent meadows, wetlands and other sensitive habitats that are included in A category scenic resources.
- Construction activities would be of a shorter duration due to the reduction in improvements to roadside parking areas and hydrology as described above, resulting in a shorter duration of restricted access to scenic vistas, and less visual intrusion of construction activities.

As a result, implementation of Alternative 3 would result in localized, negligible to minor, long-term, beneficial impacts scenic resources along the Yosemite Valley Loop Roadway.

Cumulative Impacts: Alternative 3 and the cumulative projects within and adjacent to the Merced River corridor would result in a local, long-term, major, beneficial impact on scenic resources in Yosemite Valley. This is due to the overall emphasis on restoring disturbed or developed land to natural conditions within A category scenic areas and improving the health of ecosystems within Yosemite Valley. The long-term, beneficial effects on highly valued scenic resources associated with the restoration projects proposed in the *Yosemite Valley Plan* (NPS 2000a) would outweigh any short-term, adverse effects associated with construction activities associated with Alternative 3.

Impairment: Alternative 3 would result in long-term, negligible to minor, beneficial impacts to scenic resources within Yosemite Valley. No long-term adverse impacts to scenic resources are

anticipated, and the park's highly valued scenic resources would not be impaired for future generations.

Visitor Experience and Recreation

Affected Environment

Yosemite National Park provides a wide range of recreational opportunities to park visitors that may enhance the visitor experience. Recreational activities that may take place in the project area are (but not limited to) auto touring, hiking, bicycling, sightseeing, photography, guided tours, picnicking, fishing, swimming, rafting, and climbing. Climbers often stage their trips (equipment preparation and parking) in turnouts near the start of their climbs. Because of the proximity of popular climbing walls to Valley roads and turnouts, climbing observation has also become a common visitor activity.

Impacts to visitor experience and recreation may occur as a result of changes to road circulation, interpretation facilities, trails, and other facilities and resources that contribute to the type and quality of the visit to Yosemite National Park. They may also occur from direct actions altering the availability of a specific experience or activity.

Visitor experience and recreation are also directly affected by actions influencing natural resources such as air quality, scenic resources, and cultural resources. Though impacts to these resources are not repeated in the analysis of visitor experience, enhancement or degradation of these resources also enhances or degrades the quality of the visitor experience.

Environmental Consequences – Methodology

Assumptions used in evaluating visitor experience and recreational impacts for the alternatives include the following:

- Existing facilities have come into being in response to visitor demands and needs. This includes roads, trails, turnouts, and viewpoints.
- Private vehicles are the preferred mode of travel for most visitors.
- Anticipated changes in visitor participation would represent an impact.
- Anticipated changes in trip quality would represent an impact.
- Anticipated changes in service level (such as reductions in parking or increased safety conditions) would represent an effect.

Duration of Impact: A short-term impact on visitor experiences would be temporary in duration due to construction, restoration, or demolition activities; short-term impacts are those during the duration of the construction period. A long-term impact would have a permanent effect on the visitor experience.

Intensity of Impact: Impacts are defined as negligible, minor, moderate, and major. Negligible impacts would result in little noticeable change in visitor experience. Minor impacts would result in changes in desired experiences but without appreciably limiting or enhancing critical characteristics (critical characteristics are those elements of a recreational activity that are most important to those who pursue it; for example, it may be important to picnickers to be able to drive to a picnic site). Moderate impacts would change the desired experience appreciably, (i.e., changes to one or more critical characteristics, or appreciable reduction/increase in the number

of participants). Major impacts would eliminate or greatly enhance multiple critical characteristics or greatly reduce/increase participation.

Type of Impact: Impacts were evaluated in terms of whether they would be beneficial or adverse to visitor experience. Beneficial impacts would enhance visitor participation, quality of visitor experience, and service level. Adverse impacts would be effects that reduce visitor participation, quality of visitor experience, and service level.

Environmental Consequences of Alternative 1 (No Action)

Under the No Action Alternative, impacts to visitor experience and recreational opportunities would be expected to be long-term, moderate, and adverse in nature. The following list outlines the adverse impacts to the visitor experience and recreational opportunities with the implementation of Alternative 1:

- Continued long-term deterioration of Yosemite Valley Loop Road conditions which results in park concerns regarding public safety
- Selected roadside parking areas and turnouts would continue to require improvements to accessibility to select vantage points, resulting in limited participation in and enjoyment of Yosemite Valley resources.
- Concern for public safety due to poor visibility, overhanging trees, inconsistent road width, and deteriorated turnouts and points of egress to and from the roadway would remain an issue.
- Continued deterioration of the Valley Loop Trail and bike paths in select areas adjacent to the Yosemite Valley Loop Road and roadway features such as curbing and culverts would continue to contribute to the trails' poor condition.

Routine maintenance activities would contribute to reducing adverse impacts to a minor intensity; however, implementation of Alternative 1 would represent a long-term, moderate, adverse impact to visitor experience and recreation.

Cumulative Impacts: The cumulative projects would have a local, long-term, moderate, beneficial impact on recreation due to expanded recreational opportunities in Yosemite Valley and improved transit service distributing visitors to more park destinations.

Alternative 1 and the cumulative projects in Yosemite Valley would result in a local, long-term, moderate, beneficial impact on recreation due to expanded recreational opportunities in Yosemite Valley and improved transit service distributing visitors to more park destinations. The short-term, minor to moderate, adverse impacts on recreation activities near areas of the Yosemite Valley Loop Road which require routine maintenance would be offset by the beneficial impacts of the cumulative projects.

Impairment: The No Action Alternative would result in local, short-term, minor to moderate, adverse impacts on recreation in areas were routine maintenance was conducted on the Yosemite Valley Loop Road. This alternative is not expected to impact the diversity or quality of recreational opportunities in Yosemite Valley for the long term. Therefore, Alternative 1 would not impair the park's visitor experience or recreational resources for future generations.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

Alternative 2 would be expected to result in short-term, minor, adverse impacts to visitor experience and recreational resources in Yosemite Valley due to limited access at some locations during construction. Access points to park facilities such as trails and recreation areas for hiking, swimming, fishing, and other activities may be impacted during construction activities. Sightseeing by car or bus could be affected by temporary changes in traffic circulation and access to scenic vista points. Passive recreation activities could also be disrupted by the noise and visual intrusion of construction activities. Enjoyment of the park at night could be affected by construction lighting, if required.

Conversely, actions proposed as part of Alternative 2 would be expected to have long-term, minor to moderate, beneficial effects on visitor experience and recreational activities. Beneficial impacts would be attributed to improved accessibility of turnouts at select areas, providing better access to recreational activities. Visitor safety would be beneficially impacted due to improved visibility, roadway conditions, and in select areas, improvements to trails and bike paths.

Cumulative Impacts: Alternative 2 and the cumulative projects in Yosemite Valley would result in local, long-term, moderate, beneficial impacts to visitor experience and recreation due to expanded recreational opportunities in Yosemite Valley and improved transit service distributing visitors to more park destinations. The short-term, minor to moderate, adverse impacts on visitor experience and recreation activities near construction areas would be offset by the beneficial impacts of the cumulative projects.

Impairment: Alternative 2 would result in local, short-term, minor to moderate, adverse impacts on recreation near construction activities. This alternative is not expected to impact the diversity or quality of recreational opportunities or the visitor experience in Yosemite Valley for the long term. Therefore, Alternative 2 would not impair the park's recreational resources for future generations.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Implementation of Alternative 3 would be expected to impact the visitor experience and recreational opportunities both beneficially and adversely. Under Alternative 3, informal roadside parking areas would remain unchanged, creating public safety concerns, and resulting in long-term, minor, adverse impacts to the visitor experience. Access to and the safety of trails and bike paths in select areas adjacent to the Yosemite Valley Loop Road would not be enhanced with improvements to these pathways, thus resulting in long-term, minor, adverse impacts to recreational opportunities.

Conversely, beneficial impacts to the visitor experience and recreational opportunities would be expected with the implementation of Alternative 3 for the following reasons:

- Improved accessibility to select vantage points, resulting in improved enjoyment of Yosemite Valley's recreational opportunities
- Construction activities would be of a shorter duration due to the reduction in improvements to roadside parking areas and hydrology, resulting in a shorter duration of limited access to some recreational opportunities.

Overall, actions proposed as part of Alternative 3 would be expected to have long-term, negligible to minor, beneficial effects on visitor experience and recreational activities as a result of improved roadway conditions, public safety, and accessibility.

Cumulative Impacts: Alternative 3 and the cumulative projects in Yosemite Valley would result in a local, long-term, moderate, beneficial impact to visitor experience and recreation due to expanded recreational opportunities in Yosemite Valley and improved transit service distributing visitors to more park destinations. The short-term, minor to moderate, adverse impacts on visitor experience and recreation activities near construction areas would be offset by the beneficial impacts of the cumulative projects.

Impairment: Alternative 3 would result in local, short-term, minor to moderate, adverse impacts to recreation near construction activities. This alternative is not expected to impact the diversity or quality of recreational opportunities or the visitor experience in Yosemite Valley for the long term. Therefore, Alternative 3 would not impair the park's recreational resources for future generations.

Park Operations

Affected Environment

The superintendent is responsible for overall management and operation of the park. Yosemite National Park is operationally organized into seven divisions, each with a functional area of responsibility. Park operations and facility staff, particularly the Facilities Management Division, and Division of Resources Management and Science, would be responsible for overseeing contract work undertaken for the project. Maintenance and Engineering responsibilities include buildings and grounds, roads and trails, utilities, and design and engineering. Resource Management responsibilities include natural and cultural resource monitoring and evaluation, impact mitigation, and wildlife management. In the Facilities Management Division, approximately 10 National Park Service personnel are currently assigned to Valley roads, with annual salary and operations costs of approximately $617,000.

Environmental Consequences – Methodology

Duration of Impact: Short-term impacts would last only until all construction actions associated with implementation of an alternative are completed. Long-term impacts typically last 10 years or more and would have a permanent effect on operations.

Intensity of Impact: With negligible impacts, there would not be a measurable difference in costs from existing levels. With minor impacts, measurable additions or reductions in cost would be less than 10% of existing levels. With moderate impacts, additions or reductions in cost would be between 10%-20% of existing levels. With major impacts, additions or reductions in cost would exceed 20% of existing levels.

Type of Impact: Adverse impacts represent an increase in operating costs. Beneficial impacts represent a decrease in operating costs.

Environmental Consequences of Alternative 1 (No Action)

Under Alternative 1, the existing Yosemite Valley Loop Road, El Capitan Crossover, Sentinel Drive and associated roadside parking would remain in place and be maintained and repaired. Major and minor repairs are required annually on the Yosemite Valley Loop Road, El Capitan

Crossover and Sentinel Drive. Costs associated with operating and maintaining these roadways would increase over time, particularly due to the effort required to maintain the main thoroughfare in Yosemite Valley which accommodates the vehicular traffic of over 3 million annual visitors. The effect on park operations from increased efforts and costs is considered to be moderate. Alternative 1 would have local, long-term, minor to moderate, adverse impacts on park operations.

Cumulative Impacts: Cumulative effects on park operations and facilities are based on analysis of past, present, and reasonably foreseeable future actions in Yosemite Valley in combination with potential effects of this alternative. The extent to which past, present, or foreseeable future projects could have a cumulative effect, when combined with this alternative, is determined largely by whether such projects would affect park facilities or the demand for park operations, services and facilities. Projects that effect park facilities themselves or the demand for facilities management, resource management, and maintenance of park infrastructure would have the potential for cumulative effects with the proposed project.

Park operations and facilities have been affected by numerous past management decisions and projects since the inception of the park. As examples, implementation of the actions called for in both the *Yosemite Valley Plan* and the *Revised Merced River Plan* will have local, short- and long-term, moderate adverse impacts on park operations and facilities.

Examples of some present projects that will have overall net long-term minor to moderate adverse impacts to park operations include the East Yosemite Valley Utilities Improvement Plan, Fern Spring Restoration, Curry Village Employee Housing, and the Glacier Point Road Project. These projects will improve and/or replace existing infrastructure with more modern and efficient facilities having the net effect of reducing maintenance and upkeep needs, thereby reducing demands on overall park operations. Similar results to park operations are expected as a result of many of the reasonably foreseeable projects, including the Yosemite Lodge Area Redevelopment Project, the Yosemite Village Interim Parking Improvements Project, and the Visitor Use and Floodplain Restoration in East Yosemite Valley Project.

Overall, past, present, and reasonably foreseeable future actions would have local long-term, minor to moderate, adverse cumulative impacts because of the increased demand on park operations, services and facilities over both the short- and long-term. These cumulative impacts, in combination with Alternative 1, would result in local, short- and long-term, minor to moderate, adverse impacts to park operations and facilities.

Impairment: The National Park Service has a management responsibility to conserve the scenery, natural and historic objects, and wildlife resources of the park. Park operations are not subject to the impairment standard.

Environmental Consequences of Alternative 2 (Rehabilitation Of and Improvements To Roadway and Drainage (Preferred Alternative))

Alternative 2 is expected to result in both adverse and beneficial impacts to park operations. Local, short-term, minor, adverse effects on transportation volume, circulation, delays, and safety within Yosemite Valley would be expected during construction activities. These impacts can be minimized and mitigated through development of a Visitor Communication and Protection Plan prior to start of construction.

Implementation of Alternative 2 would also be expected to result in long-term, moderate, beneficial impacts to park operations. Beneficial impacts could be attributed to decreased operational cost of maintaining the Yosemite Valley Loop Road and associated drainages due to the reduced need for major annual repairs. Improved drainages could potentially result in improved road conditions and accessibility during seasonal flooding events. Overall, impacts to Park operations would be expected to be moderate, long-term and beneficial in nature under Alternative 2.

Cumulative Impacts: Cumulative impacts to park operations are based upon analysis of past, present and reasonably foreseeable future actions in Yosemite Valley in combination with potential effects of Alternative 2. Although overall impacts from Alternative 2 to park operations along the Yosemite Valley Loop Road would be expected to be moderate, long-term and beneficial in nature as described above, the actions called for under Alternative 2, when taken in combination with past present and reasonably foreseeable future actions in Yosemite Valley would be generally the same as described in Alternative 2. These would represent local, short- and long-term, minor to moderate, adverse impacts on park operations and facilities.

Impairment: The National Park Service has a management responsibility to conserve the scenery, natural and historic objects, and wildlife resources of the park. Park operations are not subject to the impairment standard.

Environmental Consequences of Alternative 3 (Resurfacing the Roadway Only, With Drainage Improvements)

Implementation of Alternative 3 would impact park operations to the same extent as described for Alternative 2 above, with the following exceptions:

- Informal roadside parking areas would remain unchanged, with the exception of a few select iconic turnouts, potentially impacting operational costs in these areas.
- Hydrologic flow in meadows and wetland areas adjacent to the Yosemite Valley Loop Road would not be enhanced by the installation of a permeable subgrade, thus, potentially impacting roadway conditions, especially during high-water events.
- Construction activities would be of a shorter duration due to the reduction in improvements to roadside parking areas and hydrology as described above, resulting in a shorter duration of restricted transportation volume, circulation, delays, and safety concerns.

Beneficial impacts could be attributed to decreased operational cost of maintaining the Yosemite Valley Loop Road and associated drainages due to the reduced need for major annual repairs. Improved drainages could potentially result in improved road conditions and accessibility during seasonal flooding events. Overall, impacts to Park operations would be expected to be moderate, long-term and beneficial in nature under Alternative 3.

Cumulative Impacts: Cumulative impacts to park operations are based upon analysis of past, present and reasonably foreseeable future actions in Yosemite Valley in combination with potential effects of Alternative 3. Although overall impacts from Alternative 3 to park operations along the Yosemite Valley Loop Road would be expected to be moderate, long-term and beneficial in nature as described above, the actions called for under Alternative 3, when taken in combination with past present and reasonably foreseeable future actions in Yosemite Valley would be generally the same as described in Alternative 3. These would represent local, short- and long-term, minor to moderate, adverse impacts on park operations and facilities.

Impairment: The National Park Service has a management responsibility to conserve the scenery, natural and historic objects, and wildlife resources of the park. Park operations are not subject to the impairment standard.

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